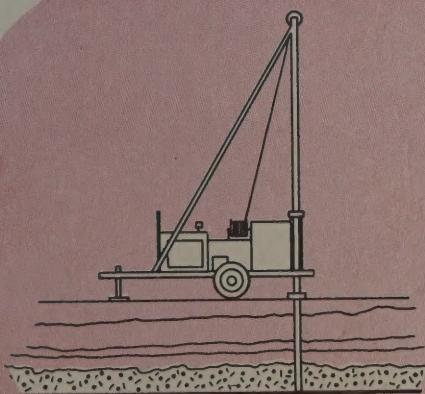
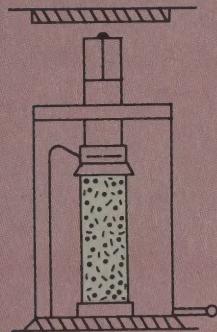


STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

RAYMOND T. SCHULER, COMMISSIONER



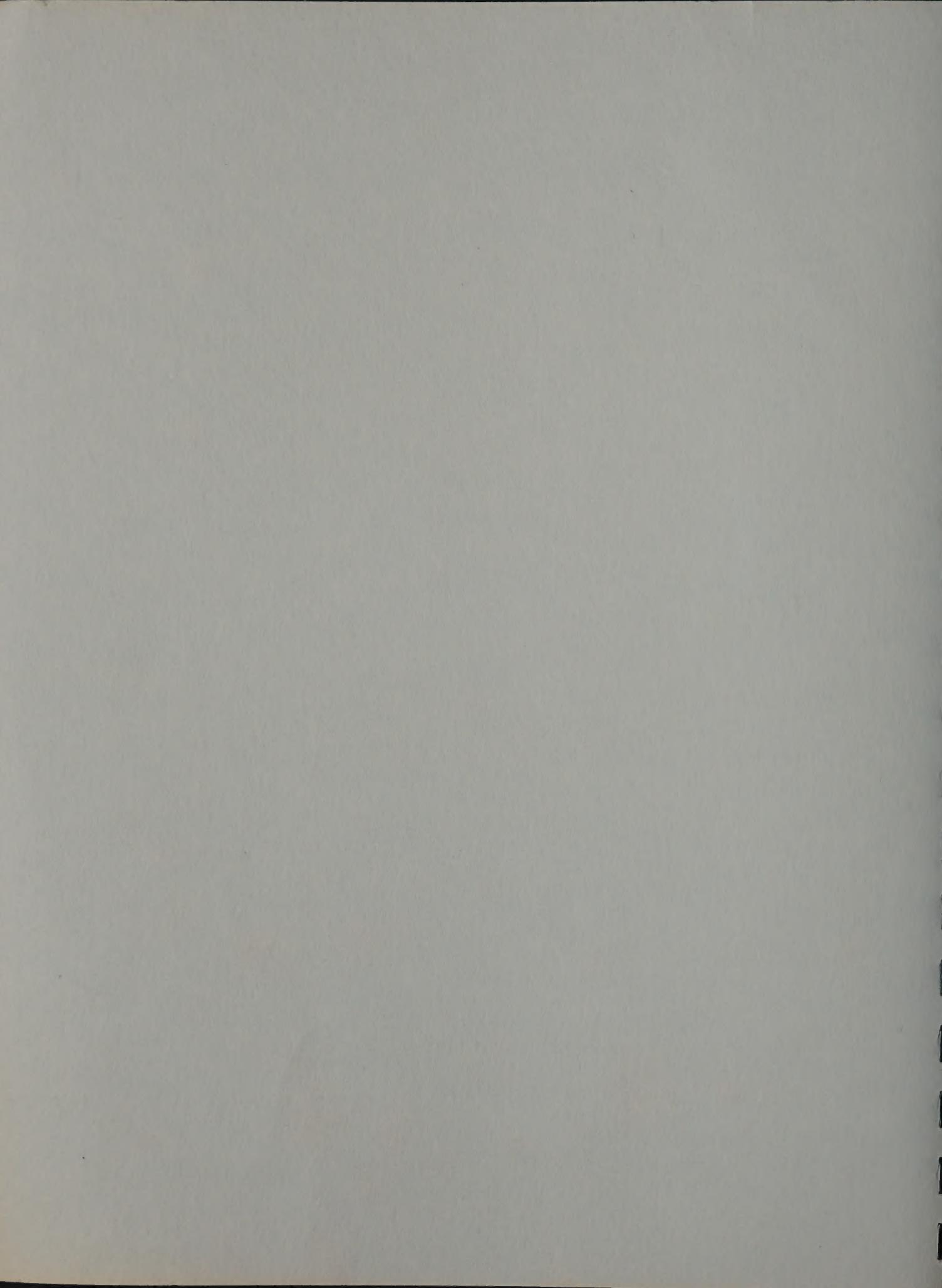
SOIL MECHANICS
BUREAU



CAYUGA LAKE BASIN
SIXMILE CREEK DAMSITES
GEOTECHNICAL STUDY
FOR FEASIBILITY EVALUATION

PIN E103-00-701.02

JUNE 1973



NEW YORK STATE
DEPARTMENT OF TRANSPORTATION
Raymond T. Schuler, Commissioner



1220 Washington Avenue, State Campus, Albany, New York 12226

July 9, 1973

Mr. John A. Finck
Director of Water Resources Planning
New York State Department of
Environmental Conservation
50 Wolf Road
Albany, New York 12205

Dear Mr. Finck:

Subject: Cayuga Lake Basin
Sixmile Creek Damsites
Tompkins County
P.I.N. E103-00-701.02

In accordance with your request of August 25, 1971 to Mr. B. A. Lefeve, we are transmitting to you the attached report, "Cayuga Lake Basin, Sixmile Creek Damsites, Geotechnical Study for Feasibility Evaluation".

In preparing our report, we were aided by information supplied by members of your staff and by subsurface exploration work performed by our Regional Soils Section. This study and report was prepared by Mr. Austars R. Schnore, Senior Soils Engineer.

Our study of the site conditions indicates that the construction of a dam is technically feasible at both the Bethel Grove Site and the Alternate Site. A very important design-related consideration in determining whether or not to carry out the proposed project is the hazard of the proposed sites -- the fact that they are located only about two miles upstream of a densely populated section of the city of Ithaca. It is true that a chain of reservoirs exists on Sixmile Creek at present. However, the proposed dam, at either site, would increase the quantity of impounded water some ten times. The location of the dam dictates that every possible precaution be taken in the design and the construction of the project to insure that the possibility of a failure is reduced to the absolute minimum.

The findings of our investigation are detailed in the report. The main points can be summarized as follows:

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July 9, 1973
Mr. John A. Finck
Page 2

1. The foundation conditions at either site were found to be far from optimum. This problem, in conjunction with the hazard of the site, may diminish the desirability of constructing a dam in this area.
2. Because of the complexity of the sites, a very thorough foundation exploration program will have to be undertaken in the final design phase.
3. Special treatment of various types will be required to insure the safety of the proposed dam. This treatment will significantly increase the cost of the project. Anticipated methods of treatment are described in our report to aid you in evaluating the feasibility of the project.

We will be pleased to meet with you to discuss this report in greater detail.

Very truly yours,

Lyndon H. Moore, Director
Soil Mechanics Bureau

By

Bernard E. Butler
Bernard E. Butler
Associate Soils Engineer

BEB:ARS:MVM

Attachment

CAYUGA LAKE BASIN

SIXMILE CREEK DAMSITES

GEOTECHNICAL STUDY
FOR FEASIBILITY EVALUATION

PIN E103-00-701.02

JUNE 1973

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
ALBANY, N.Y. 12226

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Drawings
 Subsurface Exploration Logs

1. INTRODUCTION

1.1 Authorization

This report has been prepared in accordance with a request from Mr. John A. Finck, Director of Water Resources Planning, Department of Environmental Conservation, to Mr. Bernard A. Lefeve, then Chief Engineer, Department of Transportation, dated August 25, 1971. Mr. Lefeve authorized the Soil Mechanics Bureau to proceed with this work on August 30, 1971.

Mr. Finck's request was for foundation information sufficient to permit an evaluation of the feasibility of this project. The project would ultimately consist of a dam, in excess of 120 feet high, constructed at one of two alternate locations that are under consideration. The dam at either site would retain a reservoir extending upstream for a distance of two miles.

For a project of this type the requested information goes far beyond a compilation of boring logs and laboratory descriptions of soil and rock samples. Accordingly, we have prepared this report, which describes the effect of the topographical and geological features and of the conditions disclosed by the subsurface explorations on the design and thereby on the feasibility of the project.

1.2 Scope of Report

The intent of our study and this report was to obtain and present information necessary to establish the feasibility of this project. For this purpose, the topography and geology of the entire area and each alternate proposed damsite was reviewed. The limited number of subsurface explorations made were used to define the general location and character of the dominant subsurface strata. A much more comprehensive exploration program will be required if and when it is decided to proceed further with the design of this project.

On the basis of an evaluation of the information that was obtained, methods of treatment that would be required to achieve an adequate design were selected. These are presented in this report in order to enable you to perform a more valid economic analysis and comparison. The final treatment may be different as additional subsurface information becomes available in the design stage.

Our basic study was made assuming earth dams at both sites, as originally proposed. However, considerations are also presented for the concrete dam scheme later proposed for the Alternate Site.

1.3 Information Utilized in Study

Our study was based on the following information:

1. The proposed layout at the two sites, plotted on prints made from a USGS map and received from your office with a memorandum dated September 14, 1973.
2. A 1:24,000 scale USGS map of Ithaca East quadrangle.
3. Aerial photographs of the area.
4. A United States Department of Agriculture soil survey report for Tompkins County.
5. Field inspections of the two sites by representatives of this Bureau.
6. Various sources describing the geology of this area.
7. A description of the foundation conditions at the two sites, as interpreted from surface observations and previous subsurface explorations, transmitted to us by Mr. K. Davis of your office, August 26, 1971.
8. Subsurface exploration logs from six borings, numbered B-1, and B-3 through B-7 at the Bethel Grove Site and from 7 borings, numbered A-1 through A-4, A-6, A-9, and A-9A at the Alternate Site. These borings were made by personnel of the Department of Transportation Region 3 Soils Section in 1971 and 1972. In general, 2½-inch casing was used in the overburden. However, 4-inch casing was used in borings A-9, A-9A, B-3, B-4, B-5, and B-6. Copies of the logs have been transmitted to you previously and are also included in the Appendix to this report.
9. A visual examination and classification of soil samples from these borings in our laboratory. Moisture contents of plastic soils were determined concurrently.
10. Seismic determinations of the elevation of the bedrock surface at 28 points by this Bureau.

11. A terrain reconnaissance review by personnel of this Bureau.

2.1 Topography

2.1.1 General

The two proposed damsites are located on Sixmile Creek about two miles southeast of the city of Ithaca (See Drawing No. 3SM 1819A). A number of smaller reservoirs have been constructed in the past on Sixmile Creek in the area under study and downstream. The sides of the valley, to a height of 100 to 200 feet above the floor of the Sixmile Creek valley, are considerably steeper than the hillsides forming the general relief of the area. Numerous small streams, draining into Sixmile Creek from the southwest, have carved deep V-shaped gullies. Traces of old and not-so-old landslides are visible on the side slopes of the valley.

2.1.2 Bethel Grove Site

The proposed Bethel Grove Site is located at the upstream end of the existing Ithaca Reservoir. The existing reservoir has a normal pool elevation of 704. The valley here has a flat bottom, about 1000 feet wide. The side slopes are moderate (typically inclined at 1 vertical on 3 horizontal). Two streams draining into Sixmile Creek from the left (looking downstream) form a narrow, steep-sided ridge, across which it is proposed to construct the spillway. Accessibility to the site is good, except in the gully that is the proposed location of the spillway outlet channel.

2.1.3 Alternate Site

The so-called Alternate Site is one half of a mile downstream of the Bethel Grove Site, at the opposite end of Ithaca Reservoir. Here Sixmile Creek flows in a narrow, steep-sided gorge. A small tributary has cut a gully, about 100 feet deep, separating a knob from the southwest wall of the valley. The axis of the proposed dam crosses the steep-sided Sixmile Creek valley, the tributary gully, and the intervening knob. Evidence of numerous landslides, some quite recent, is visible in the gully and on the steep southwest bank of Sixmile Creek.

2.2 Geology

The bedrock in this area belongs to the Genesee group, which consists of alternating, nearly horizontal beds of shale, siltstone and sandstone. During the last ice age, the glacier moving southeast along the axis of the Sixmile Creek Valley scoured and deepened the pre-existing valley and deposited a mantle of till over the bedrock. As the glacier melted, a lake was formed in the valley between the retreating ice front and the divide to the south of White Church. Lake sediments consisting of silts and clays were deposited in the lake. Delta deposits of sand were formed where streams flowed into the glacial lake.

After retreat of the glacier, the lake drained. The post-glacial streams eroded their channels down through the glacial sediments, depositing, in turn, loose alluvium. As stream erosion progressively steepened the slopes, the lake sediments were subject to landslides, a process still taking place.

Sixmile Creek became trapped in the side of the older rock valley at the Alternate Site during the process of re-cutting the valley down through the glacial sediments. Once entrapped in the rock, the creek was no longer free to meander in this section but occupied itself with downcutting along its joint-controlled course.

2.3 Proposed Facilities

As part of this project, it is proposed to impound a reservoir for the purpose of water supply, water quality control, and recreation.

The controlling elevations at the two sites under consideration, as indicated by your office, are as follows:

	Bethel Grove Site	Alternate Site
Elevation of crest of dam	823	808
Normal pool elevation	800	785

Earth dams were proposed originally, with combined service and emergency spillways located in the left and the right abutment at the Bethel Grove and Alternate Sites, respectively. A later scheme proposed a concrete dam with a central overflow section for the Alternate Site.

2.4 Subsurface Conditions

2.4.1 Bethel Grove Site

The locations of borings and seismic determinations made at the Bethel Grove Site are shown in Drawing No. 3SM 1819B. This drawing is an enlargement of a portion of a 1:24,000 scale USGS map and, as such, is considered to be of sufficient accuracy for preliminary purposes only.

Subsurface profiles along lines A-A and B-B are also shown in Drawing No. 3SM 1819B. The number of explorations was not sufficient to determine definite limits of strata. Probable boundaries between different soil deposits have been denoted on the profiles by solid lines. Possible boundaries are indicated by dashed lines.

The uppermost soil stratum found in the borings progressed at the abutments of the proposed dam consists of glacial lake deposits -- layered silts and clays -- stiff in the upper 20 feet but becoming softer at greater depths. Boring B-7, in the right abutment, encountered soft to firm silts and clays to a depth of 81 feet (Elev. 744). In boring B-4, at the left abutment, these materials extend to a depth of 45 feet (Elev. 778). These silts and clays must be assumed to have a low shearing strength and to be quite compressible. The upper brown "crust" of this material will be suitable for embankment construction. However, the lower gray material, because of its high moisture content, should be considered as unsuitable for utilization in the embankment.

Pervious mixtures of compact gravel, some sand, a trace of silt, and containing boulders (probably glacial outwash) were found in the upper 40 feet of boring B-5, on the lower slopes of the left abutment. Below these depths, the above borings encountered very compact bouldery glacial till.

Two borings, B-1 and B-3, were made near the location of the proposed spillway. The soils encountered in these borings were primarily silts with minor admixtures of fine sand, clay, and shale fragments. In boring B-1 (surface elevation 861.8) this material is comparatively loose near the surface, becoming compact only at a depth of 40 feet. In boring B-3 (surface elevation 735.9) this material is extremely compact from the ground surface to a depth of 28 feet where bedrock was encountered.

The bedrock at the site consists of nearly horizontally bedded shale. Only three of the borings (B-3, B-5, and B-6) made along the alignment of the proposed dam were progressed to bedrock. Additional information regarding the depth to bedrock can be obtained from seismic data. The bedrock elevation at each seismic point is listed in a tabulation of seismic data included in this report. The combined boring and seismic data indicate that bedrock is between Elev. 710 and 740 at the right abutment. In the stream valley it is near Elev. 700 or just below ground surface, dipping down to below Elev. 630 at drill hole B-5. In the area of the spillway channel the bedrock surface is near Elev. 700.

Groundwater was observed only in borings B-3, B-5 and B-6, at depths of 2, 4, and 1 feet, respectively. The position of the groundwater level at borings B-4 and B-7 can be inferred from the location of the boundary between the brown and the gray silts and clays. In both of these borings this boundary is at a depth of approximately 15 feet.

2.4.2 Alternate Site

The locations of borings and seismic determinations for the Alternate Site are shown in Drawing No. 3SM 1819C, which is an enlargement of a USGS map and is sufficiently accurate only for a preliminary study.

A subsurface profile along the proposed axis of the dam is also shown in Drawing No. 3SM 1819C. Again, because of the limited number of explorations, the boundaries of the various soil deposits cannot be determined reliably at this time.

Alluvium, consisting of mixtures of sand, gravel, and silt, with traces of organic material was found to depths of about 20 feet in boring A-2 and 8 feet in boring A-6. Otherwise, the predominant surface soils are soft to firm layered silts and clays (glacial lake deposits). These silts and clays were found in boring A-2 between depths of 20 and 63 feet, in boring A-3 to a depth of 52 feet, and in boring A-4 to a depth of about 30 feet. This soil must be assumed to have a low shearing strength and to be highly compressible. The upper brown silts and clays, found in the borings generally to a depth of 20 feet below ground surface, are suitable for embankment construction. The underlying gray silts and clays, because of their high moisture content and low rate of drying, cannot be counted on to provide satisfactory embankment material.

N.Y.S. DOT
 Soil Mechanics Bureau
 June 13, 1973

Cayuga Lake Basin
 Six-mile Creek Damsites
 Seismic Data

Seismic Point	Baseline Station	Offset	Ground Elev.	Seismic Depth	Bedrock Elev.
SP-1	31+51	1395' Rt.	828.1	116'	712.1
SP-2	35+25	1078' Rt.	831.9	95'	736.9
SP-2A	33+77	1210' Rt.	830.4	> 70'	< 760.4
SP-2B	32+15	1330' Rt.	829.0	106'	723.0
SP-3	"A" 16+40	0'	824.9	97'	727.9
SP-4	33+90	783' Rt.	827.9	71'	756.9
SP-5	"C" 3+40	55' Rt.	839.3	118'	721.3
SP-5A	"C" 2+10	40' Rt.	846.1	>100'	< 746.1
SP-6	"C" 0+65	20' Rt.	852.3	>100'	< 752.3
SP-7	"B" 4+80	10' Lt.	721.1	76'	645.1
SP-8	76+28	590' Rt.	718.1	70'	648.1
SP-9	153+75	32' Rt.	779.2	140'	639.2
SP-10	157+55	40' Rt.	779.2	>100'	< 679.2
SP-11	153+85	10' Rt.	808.8	177'	631.8
SP-12	148+75	70' Rt.	809.1	>100'	< 709.1
SP-13	147+92	400' Lt.	809.1	137'	672.1
SP-14	144+75	20' Lt.	809.1	91'	718.1
SP-15	153+48	210' Lt.	809.1	205'	604.1
SP-16	87+30	87' Lt.	856.8	145'	711.8
SP-17	93+65	35' Lt.	891.6	135'	756.6
SP-18	161+70	15' Rt.	724.1	16'	708.1
SP-19	159+95	110' Lt.	724.0	15'	709.0
SP-20	5+50	225' Rt.	826.7	44'	782.7
SP-21	5+85	437' Rt.	807.3	50'	757.3
SP-22	5+15	35' Rt.	849.7	41'	808.7
SP-24	6+48	818' Rt.	779.7	33'	746.7
SP-25	175+22	415' Lt.	826.5	26'	800.5
SP-26	172+38	497' Lt.	802.8	44'	758.8

The compressible lake sediments in borings A-2, A-3, A-4, and A-6 are underlain by very compact glacial till (boulders, gravel, sand and silt). Borings A-2 and A-3 were terminated in the glacial till, 150 feet below ground surface. Borings A-2 and A-6 in the right abutment, however, encountered bedrock at depths of 37 feet and 45 feet, respectively.

Borings A-9 and A-9A were drilled on the lower slopes of the right abutment, where Sixmile Creek has removed the overburden, and bedrock outcrops on the surface. Boring A-9 was drilled vertical while A-9A was drilled adjacent to A-9 at a 45° angle into the rock slope.

As shown on Drawing No. 3SM 1819C, the surface of the bedrock dips gently from about Elev. 780 at the spillway location, outcropping at about Elev. 750 on the north slope of the Sixmile Creek gorge. From there the rate of dip appears to increase, so that boring A-3 was progressed to Elev. 640 without encountering bedrock. Seismic points in this area indicated bedrock to occur between Elev. 600 and 640. In the area of the gully at the south end of the dam, the bedrock surface rises again, to Elev. 672 at seismic point SP-13 and Elev. 718 at seismic point SP-14.

Boring A-1, on the left bank of the gully eroded by the small tributary stream, disclosed a soil profile entirely different from that found in the other borings. The surface soil to a depth of 38 feet is a medium compact to very compact material composed mainly of silt with lesser quantities of fine sand and clay and shale fragments. A very pervious uniform sand, possibly a delta deposit, was found between depths of 38 and 75 feet. The boring was stopped at a depth of 75.7 feet in very compact sand, gravel, and silt, possibly the very compact bouldery glacial till found in other borings at this site.

Groundwater was observed only in borings A-1 and A-2, at depths of 10 and 30 feet, respectively. However, based on the change in the color of the silt and clay deposit, in our opinion the static groundwater level at borings A-2, A-3, and A-4 is at a depth of approximately 20 feet.

3. EFFECTS OF SITE CONDITIONS ON PROJECT

3.1 Downstream Hazard

Two miles downstream from the proposed project sites, Sixmile Creek leaves a narrow gorge to flow between a hillside and a flat alluvial fan, occupied by a relatively densely populated area of the city of Ithaca. Because of this fact, greater care than usual must be taken in foundation investigations, and the design and construction of the project.

3.2 Stability of Reservoir Shoreline

The fine-grained glacial lake deposits that are present on the sides of the creek valley have a low shearing strength and are subject to sliding on even moderate slopes. Traces of old and recent landslides can be seen throughout this area. Eventually all clay slopes subject to seepage tend to assume an angle of about 10 degrees. This is an extremely slow process however, frequently requiring many hundreds of years.

The frequency of slope failures will be increased only slightly by the newly impounded reservoir. The adverse effects on the stability of the slopes resulting from wave action and buoyancy at the bottom of the slope will be counteracted to some extent by the reduction of the hydraulic gradient in the slope.

The potential amount of material that could slide into the reservoir will be very small in comparison with the volume of the reservoir. The reduction in reservoir capacity from this source, or the sudden rise in reservoir water level as a result of a slide, is considered to be insignificant. Some muddying of reservoir waters will occur, but it is expected to be minor when compared to that which could result from any extensive grading of the shoreline.

Slide material should not be permitted to block the outlet works or the spillway. This should be taken into account in locating these facilities and in designing slopes in their vicinity.

In summary, it is not considered to be practical or necessary to flatten all silt and clay slopes around the periphery of the reservoir to an ultimately stable slope.

3.3 Bethel Grove Site

3.3.1 Removal of Low-Strength Soils

Soft to firm silts and clays make up the surface soils at both abutments of the proposed dam. Because of their assumed low strength, these materials will most likely have to be removed under parts of the dam to insure its stability. The anticipated extent of excavation that will be required in these soils is shown in Drawing No. 3SM 1819D. Permanent excavation slopes will have to be made very flat to insure stability after filling of the reservoir and to reduce differential settlements where the embankment is founded on the compressible soils. The actual required extent of excavation and the side slopes will have to be determined in the design stage when more complete information becomes available. The excavation layout shown in 3SM 1819D can be used for the purposes of an economic analysis and comparison.

3.3.2 Foundation Seepage Control

Seepage through the pervious deposit encountered in the upper 42 feet of boring B-5 will have to be controlled by either constructing a cut-off through this deposit or by placing an impervious blanket over it for some distance upstream of the dam. The excavated gray silts and clays may be suitable for this purpose. The method should be selected in the design stage based on a more complete subsurface exploration program.

On the basis of presently available information, the bouldery glacial till, found below a depth of 42 feet in boring B-5 and underlying the silts and clays in other borings, is considered to be sufficiently impervious that a complete cut-off will not be required through it. However, this material should be investigated in greater detail in design. Where the dam is placed directly on this material, a shallow core trench will have to be excavated in this material to an assumed depth of 5 feet. This will serve to "key" the embankment to the foundation, preventing a seepage path along the contact between the embankment and the foundation.

Where the dam is to be founded on bedrock, the rock foundation can be expected to require the following treatment:

1. Excavation of a cut-off trench to intact rock.
2. Cleaning of the rock surface with water jets.

3. Filling of open cracks in the rock surface with a thick grout or a wet concrete. The lateral limits for this treatment are shown in Drawing No. 3SM 1819F.
4. Installation of a grout curtain to reduce seepage through the openings in the rock. For estimate purposes the grout holes can be assumed to be 60 feet deep, spaced at 5 feet center-to-center, and taking 0.2 sacks of cement per foot of depth in each hole. The anticipated lateral limits of the grout curtain are shown in Drawing No. 3SM 1819G.

3.3.3 Cross Section of Dam

A preliminary dam cross-section to be used for an economic analysis is shown in Drawing No. 3SM 1819F. The top width of 32 feet was shown in a layout dated October 1971, received from your office. The one vertical on two and one-half horizontal downstream slope and one vertical on three horizontal upstream slope shown in this layout are good preliminary estimates. Buttress fills, as shown in Drawing No. 3SM 1819G may be required at the right abutment, where the embankment will rest, in part, on the low-strength silts and clays.

For the time being, the dam can be assumed to be homogeneous. During the design stage, the cross-section of the dam can be modified based on an analysis of the availability of various types of borrow materials and of their strength and other properties.

The drainage blanket should consist of a processed granular material designed to prevent erosion of the adjacent material while having adequate permeability for the amount of flow it may be required to carry. The drainage blanket should be extended up into the body of the dam in the form of a "chimney drain" for the following reasons:

1. It provides a more positive way of intercepting seepage and, thereby, a margin of safety that is considered desirable because of the damage potential downstream of the dam.
2. The consideration that supporting the right end of the dam on compressible soils will lead to differential settlements which could cause the development of cracks in the dam. The chimney drain will still intercept seepage and help prevent progressive erosion, should a transverse crack occur in the dam.

To estimate the cost, the drainage blanket and chimney drain can be assumed as being 8 feet thick.

The depth of the cut-off or key trench will vary depending on the foundation conditions that will be disclosed by more detailed subsurface explorations and during construction.

For estimate purposes the upstream slope protection against wave action can be assumed to be an 18-inch layer of stone filling (medium), supported on a six-inch layer of bedding material. For a description of these materials, see N.Y.S. Department of Transportation Standard Specifications of January 2, 1973. The slope protection can be discontinued five feet below normal low water level. The downstream slope can be protected against surface erosion by topsoiling and seeding.

3.3.4 Spillway

The closest boring to the proposed location of the spillway control structure is B-1. Very compact silty material, that will provide adequate support for the structure, was found in this boring at a depth of 40 feet (Elev. 822). The boring was terminated at Elev. 784 without encountering bedrock. If the spillway control structure is placed on soil instead of rock, particular attention should be paid to controlling seepage around and under the structure, so that high hydraulic gradients would not cause piping or erosion. The location of the spillway may have to be adjusted during design to obtain a good foundation for the spillway chute. Provisions for seepage control and drainage will have to be included in the design of the chute, in order to control uplift forces and prevent erosion.

The ridge between the reservoir and spillway outlet channel is relatively narrow. The silty material found in boring B-1, although quite compact, will not be very erosion-resistant when saturated and exposed on a slope. There is little doubt that, after construction of the proposed dam and impoundment of the reservoir, the natural slope on the west side of the spillway outlet channel will become saturated to a considerable height. Therefore, a method, such as shown in Drawing No. 3SM 1819G, consisting of a triangular section of fill containing perforated underdrain pipe surrounded by filter material, will have to be used to keep the saturated soils weighted down and to collect seepage from the slope. The filter material will have to be similar to that used for the drainage blanket in the dam. The material placed over the filter material should be similar to the embankment material used in the dam.

3.4 Alternate Site

3.4.1 Removal of Soft Soils

Based on the information available from borings A-2 and A-3, the knob of land crossed by the axis of the proposed dam consists, above Elev. 740, mainly of soft to firm silts and clays. Considering their assumed low strength and the topography of the knob, the dam cannot be constructed on these soils with any certainty that it will be stable. Therefore, we anticipate that the silts and clays will have to be removed for their full depth and for such a width as to permit the dam to be constructed across the knob on a foundation of compact glacial till. The anticipated limits of removal are shown in Drawing No. 3SM 1819E. The excavation slope in the silts and clays downstream of the dam can be made steeper than elsewhere, because filling of the reservoir will not affect its stability and a slope failure here would not endanger the dam.

A smaller deposit of silts and clays is found at the right abutment of the dam. This should also be removed and sloped back as shown in Drawing No. 3SM 1819E. At this stage total removal appears to be more economical than partial removal and construction of buttress fills. Approximate limits of removal are shown on this drawing to permit an estimate of the quantity of removal.

3.4.2 Flattening of Steep Slopes

At the proposed Alternate Site for the dam, Sixmile Creek flows in a steep-sided gorge. Steep abutments are not desirable for an earth dam for the following reasons:

1. It is difficult to get good contact between the embankment and the rock face of the abutment when compacting against a steep jagged slope.
2. Differential settlement within the dam, caused by abrupt changes in the height of the dam, can lead to cracking.

Therefore all natural slopes beneath the dam should be flattened to an inclination not steeper than 1 on 1.

3.4.3 Foundation Seepage Control

The pervious sand deposit found in boring A-1 will require special treatment. It cannot be ascertained from the available information whether this deposit occurs at ground surface below the level of the proposed reservoir and, if so, over how large an area. Depending on the findings of a more detailed investigation in the design phase, a deep cut-off, an impervious upstream blanket combined with relief wells downstream of the dam, or just relief wells may be required.

Elsewhere, where the dam is constructed on compact and relatively impervious soils, a minimum five feet deep key trench will be required. Where the dam is founded on rock the trench should extend to intact rock.

The rock foundation in contact with the impervious material near the central part of the dam will have to be cleaned with high pressure water jets. Subsequent to the cleaning, open fissures and cracks in the rock should be filled with thick grout to prevent loss of fine-grained materials into the rock. The steep rock slopes will probably have to be gunited. Limits for this treatment are shown in Drawing No. 3SM 1819F. A grout curtain will be required in the rock. The anticipated lateral limits of the grout curtain are shown in Drawing No. 3SM 1819H. For estimate purposes, it can be assumed that the grout holes will be 60 feet deep, spaced at five-foot intervals, and that the average grout take will be 0.2 bags of cement per linear foot of grout hole.

3.4.4 Cross-section of Dam

A crest width of 32 feet, the same as shown in a layout for the Bethel Grove Site, was assumed also for the proposed dam at the Alternate Site. The side slopes of 1 vertical on 3 horizontal upstream and 1 vertical on 2½ horizontal downstream as shown by your office, are appropriate at this stage. The actual side slopes should be based on a detailed analysis during design.

In general, the same considerations regarding the cross-section of the dam as at the Bethel Grove Site apply. The homogeneous earth dam shown should be subject to review based on an analysis of the availability of various types of embankment materials during the design stage. If a zoned dam is selected, the thickness of the impervious core may have to be increased where it contacts the steep rock abutments.

The drainage blanket under the downstream portion of the dam should be extended up into the body of the dam as a "chimney drain" for the additional safety it provides. The preliminary dimensions and limits of the chimney drain and drainage blanket are shown in Drawing No. 3SM 1819F.

The possibility of transverse cracking in the upper part of the dam, as a result of the steep valley sides, should be given careful thought in the design. Some of the precautionary measures that might be employed are:

1. Careful selection and control of materials and construction procedures to minimize cracking.
2. Widening of drainage zones in the critical areas to enable them to carry increased flow if cracking occurs.
3. Scheduling of embankment construction to minimize differential settlements.

The same type of material as that described for the Bethel Grove Site will provide adequate protection of the upstream slope against wave action. The downstream slope can be protected against erosion by topsoiling and seeding.

3.4.5 Spillway

A modified spillway layout is shown in Drawing No. 3SM 1819H. The main modification has been an increase in the width of the approach channel to reduce the velocity and improve the efficiency of the spillway. A side channel spillway should be considered, if it is found that the cut slopes for the proposed alignment encroach on the adjacent highway. If a bridge is to be built across the spillway, a side channel spillway will require a shorter structure.

Tentatively we have assumed a stilling basin at about elevation 750. The flow from the stilling basin to the creek channel would be uncontrolled down the rock slope, except for a training wall at the bottom of the slope, directing flow away from the dam.

Cut slopes in this type of rock are usually designed at an inclination of 1 vertical on 1 horizontal. The excavation for the spillway will be partly in earth and partly in rock. Therefore an average inclination for rock and soil of 1 vertical on 2 horizontal can be assumed for the spillway cut slopes for preliminary estimate purposes.

3.4.6 Considerations for Concrete Dam

For the concrete dam scheme transmitted with your cost estimates of October 10, 1971, the recommendations for foundation treatment discussed for an earth dam generally apply with the following exceptions:

1. The highest part of the dam will be constructed as a concrete gravity dam.
2. The proposed spillway in the right abutment will be eliminated. Instead, the concrete dam is provided with a central overflow section.
3. Special treatment will be required at the junction between the concrete and the earth fill sections of the dam.

The subsurface explorations indicate that bedrock at the Alternate Site occurs at a lower elevation than assumed in the upstream elevation of the concrete dam scheme included with your cost estimates. Based on very limited data, it is anticipated that the average depth to suitable rock on which to found the concrete dam will be about 10 feet below bedrock surface.

Critical locations for the safety of the project will be the junctions between the concrete dam and the abutting earth fill sections. An adequate system of cut-offs and drains should be provided here to minimize the quantity of seepage, prevent piping, and control hydrostatic pressures in the fills.

A grout curtain similar to that for the earth dam alternates discussed above will be necessary below the dam, near the upstream toe. The lateral limits of the grout curtain are indicated in Drawing No. 3SM 1819H. A line of drainage holes should be provided just downstream of the grout curtain, in order to reduce uplift pressures under the dam. A drainage gallery should be included in the body of the dam. This gallery will collect drainage from the drainage holes and facilitate additional grouting if such should prove necessary.

3.5 Availability of Construction Materials

Impervious soil for the embankment will be available; at least in part, from required excavation. If additional impervious material is required, glacial till would be the optimum material for a homogeneous dam because of its low permeability and high strength. Pervious materials for a zoned dam are available from terrace deposits in the proposed reservoir area.

The filter material for the drainage blanket in the dam will require high-quality gravel. Such gravel is available at Brooktondale, 3 or 4 miles southeast of the proposed damsites. This gravel, however, will most probably require processing to obtain the required gradation.

The stone used for protecting the upstream slope against wave action has to be highly resistant to weathering. The nearest known source of acceptable stone is the Cayuga Crushed Stone Corp. quarry south of Ludlowville.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 General

The need for a reservoir at this location should be weighed carefully against the potential damage downstream in case of a failure.

4.2 Required Foundation Treatment

The difficult foundation conditions existing at the two sites under consideration will dictate special treatment to insure the safety of the dam. A preliminary appraisal of the required treatment is described above and summarized below. The actual treatment should be based on extensive analyses of stability, settlement, and seepage. This treatment will add materially to the cost of this project and should be included in the cost estimates when evaluating the feasibility of the project. For the most part, the types of required treatment are similar at the two sites.

1. Removal and sloping back of low-strength foundation soils. The gray silts and clays should not be considered as potential embankment material.
2. Flattening of rock slopes beneath the dam at the Alternate Site to not steeper than 1 on 1.
3. Surface grouting and/or guniting of fissures in the surface of the rock foundation.
4. Cut-offs through pervious materials. This is an item which may be very expensive but regarding the extent of which we have comparatively little information. Shallow key trenches will be sufficient in other materials.

5. Grout curtain in rock where the dam is on a rock foundation.
6. A chimney drain in the dam.
7. Cut-offs and collector drains for the spillway control structure at the Bethel Grove Site.
8. A seepage collection and slope stabilizing system for the slope on the west side of the spillway chute and outlet channel at the Bethel Grove Site.
9. Cut-offs and collector drains at the junction between concrete and earthfill sections if a concrete dam is considered for the Alternate Site.

4.3 Subsurface Investigation Program for Design

The subsurface investigation program for the design of this project should be planned so as to:

1. Measure those properties of the subsurface deposits that will affect the design and performance of the project. To accomplish this, the following will be required:
 - a. Borings to obtain soil samples and rock cores for identification and testing.
 - b. Test pits and trenches to examine and sample materials, such as the bouldery glacial till, that cannot be sampled satisfactorily using small-diameter equipment.
 - c. Field permeability tests in soils and bedrock.
 - d. The use of a bore hole camera to investigate zones in rock that exhibit poor core recovery.
2. Delineate adequately the boundaries between the different foundation strata. This will require:
 - a. A combination of surface reconnaissance, borings, and test trenches to find the surface and subsurface contacts between the foundation strata.

- b. A flexible program, with the information available at any one time used to determine the location of further explorations.
- c. Close cooperation between the drill crews and the designer. It is recommended that the designer personally oversee the subsurface exploration program in the field.

3. Determine the properties of construction materials, including those that will have to be brought in from sources off the site and the extent of these sources. An analysis of the types of materials available on site will indicate what materials will have to be imported. The U.S. Department of Agriculture Soil Survey report will be of value in locating sources of construction materials. Laboratory tests should be performed on the materials to ascertain their suitability for their intended use and to obtain data for use in design.

APPENDIX

DISTRICT NO. 3
 COUNTY THOMPKINS
 PROJ. NO. E10300

STATE OF NEW YORK
 DEPARTMENT OF TRANSPORTATION
 SOIL MECHANICS BUREAU
 SUBSURFACE EXPLORATION LOG
 (STATE FORCES)

HOLE NO. A-2
 LINE & STA. See Coordinates below
 OFFSET

PROJECT CAYUGA LAKE BASIN - SIX MILE CREEK DAM SITE

QUAD. LOCATION 15-1-7-32 DATE, START 11/12/71 SURF. ELEV. 809 1
 SOIL SERIES DUNKIRK DATE, FINISH 12/23/71 DEPTH TO WATER -30.0 ft
 (ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2 1/2 I.D. 2 1/2 WEIGHT OF HAMMER 300 lbs. HAMMER FALL
 SAMPLER O.D. 2 1/2 I.D. 1 1/2 INSIDE LENGTH OF SAMPLER 18" CASING 18" SAMPLER 18"

DEPTH BELLOW SURFACE	BLows ON CASING	SAMPLE NO.	BLows ON SAMPLER	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
- 0			0 6 12 18 24					N 880,500 E 532,100
12								
32								
18								
12								
5	11							
16	J-1 2 2							
14			3				SILT & GRAVEL, SO. SAND (FRIABLE)	50'-65'
17								
13								
10	12							
15	J-2 2 2							
15			3				D BR GRAVEL, SO. SILT & SAND	10.0'-11.5'
16								
14								
15	12							
32	J-3 7 7							
45			8				D BR GRAVEL, SO. SILT & SAND	15.0'-16.5'
53								
42								
20	39							
35	45 4 5						LOST SAMPLE	20.0'-21.5'
41			6					
43								
47								
25	59							
45	J-4 3 5						SILT, TR. CLAY, SAND & GRAVEL	250'-26.5'
48			4					
48								
76								
30	81							
65	J-5 9 7							
85			7				M GRAY SILT, TR. CLAY	300'-31.5'
69								
82								
35	78							
71	J-6 2 3							
90			3				M GRAY SILT, SO. CLAY	350'-36.5'
66								
72								
40	72							
66	J-7 3 3							
72			3					
55								
56								
43								
60	J-8 1 2							
56			2					
56								
47								
45								

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF THE BIDDER.

DRILL RIG OPERATOR J. BLOCK
 SOIL DESCRIPTIONS J. FRANKE
 ROCK DESCRIPTIONS J. FRANKE
 DISTRICT SOILS ENGR. J. CHRISTOPHER
 SHEET 1 OF 3. HOLE NO. A-2

DISTRICT NO. 3
COUNTY: CAMPKINS
PROJ. NO. E10300

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MEGHANTS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. A-2
LINE & STA.
SEE COORDINATES BELOW
OFFSET

PROJECT CAYUGA LAKE BASIN - SIX MILE CREEK DAM SITE
QUAD. LOCATION 151/1/4K 32 DATE, START 1/12/71 SURF. ELEV. 309.1
SOIL SERIES DUNKIRK DATE, FINISH 12/23/71 DEPTH TO WATER -30.0 ft.
(ALSO DESCRIBE UNDER "REMARKS")

DEPTH BELOW SURFACE	CASING SAMPLE NO.	BLOWS ON SAMPLER	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	HAMMER FALL CASING 16" SAMPLER 16"	
							N 880, 500 REMARKS	E 532, 100
0								
50	56 J-9 2 2	2		W BR	CLAY & SILT	50.0'-51.5'		
	54							
	40							
	53							
55	62							
	81 J-10 1 1			W BR	SILT, SO. CLAY,	55.0'-56.5'		
	79	2						
	71							
	53							
60	60							
	59 J-11 2 3	3		W BR	SILT, SO. CLAY	60.0'-61.5'		
	64							
	65							
	85							
65	67							
	54 J-12 4B 59							
	96	84		M BR	SILT, SO. FINE TO MED.	65.0'-66.5'		
	64							
	125							
70	80							
	106 J-13 16 54			M BR	SILT & SAND, SO. FINE	70.0'-71.5'		
	86	67						
	77							
	111							
75	75 J-14 100/5							
	100							
	120							
	95							
	110							
80	66 100/5"							
	122							
	80							
	80							
	96							
85	63							
	122 J-15 69 100							
	106							
	90							
	89							
90	88 J-16 DRILLED							
	88 J-17 61 76							
	150	98						
	130							
	300							
95	320							
	360 J-18 DRILLED							
	365 J-19 45 75							
	170	86						
	125							
100	136							

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DRILL RIG OPERATOR J. BLOCK

SOIL DESCRIPTIONS A. FRANKE

ROCK DESCRIPTIONS A. FRANKE

DISTRICT SOILS ENGR. J. CHRISTOPHER

A. FRANKE

SHEET 2 OF 3. HOLE NO. A-2

DISTRICT NO. 3
COUNTY TOMPKINS
1. PROJ. NO. F10300

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. A-2
LINE & STA.
SEE Coordinates Below
OFFSET

PROJECT CAYUGA LAKE BASIN - SIX MILE CREEK DAM SITE
QUAD. LOCATION 15 1/4 SK. 32 DATE, START 11/12/71 SURF. ELEV. 809 1
SOIL SERIES DUNKIRK DATE, FINISH 12/23/71 DEPTH TO WATER -30.0 ft
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75 I.D. 2.25 WEIGHT OF HAMMER 300 lbs.
 SAMPLER O.D. 2.00 I.D. 1.50 INSIDE LENGTH OF SAMPLER 18" HAMMER FALL
 Casing 18" Sampler 18"

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF THE BIDDER.

DRILL RIG OPERATOR J. BLOCK
SOIL DESCRIPTIONS A. FRANKE
ROCK DESCRIPTIONS A. FRANKE
DISTRICT SOILS ENGR. J. CHRISTOPHER
SHEET 3 OF 3. HOLE NO. A-2

DISTRICT NO. 3
COUNTY TOMPKINS
PROJ. NO. 1030070

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. A-3
LINE & STA. 4820, 865
OFFSET 32.410

PROJECT CAYUGA LAKE BASIN (6 MILE CREEK DAM SITE)
QUAD. LOCATION 75-1/3K 32 DATE, START 1-6-72 SURF. ELEV. 793 2
SOIL SERIES DUNKIRK DATE, FINISH 2-9-72 DEPTH TO WATER 10' (NOTE)
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75 I.D. 2.25 WEIGHT OF HAMMER 300 lbs.
SAMPLER O.D. 2.00 I.D. 1.50 INSIDE LENGTH OF SAMPLER 12" HAMMER FALL
CASING 18" SAMPLER 15"

DEPTH BELOW SURFACE	BLows ON Casing	SAMPLE NO.	BLows ON SAMPLER	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
0			0 6 12 18 24					
12								
25								
34								
41								
56								
59	J-1	11	9		M	GYR	VARVED SILT	50'-65'
25			8					
34								
47								
41								
10	46	J-2	6	8			W BR SILT, TR. CLAY	100'-115'
				10				
15	43	J-3	12	10			W BR SILT	150'-165'
				10				
								WOH = WEIGHT OF HAMMER
20	32	J-4	WOH	1			SILT, SO. CLAY, TR. W GRY GRAVEL	200'-215'
				2				
25	32	J-5	1	1			W GRY SILT, TR. CLAY & GRAVEL	250'-265'
				1				
30	22	J-6	1	2			SILT, SO. CLAY, TR. W GRY FINE GRAVEL	300'-315'
				1				
35	42	J-7	1	1			W GRY SILT, SO. CLAY	350'-365'
				2				
40	77	J-8	1	2			W GRY SILT & CLAY	400'-415'
				1				
45	78	J-9	2	1			W GRY SILT, TR. CLAY	450'-465'
				2				
50	77							
	78							

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DRILL RIG OPERATOR J. BLOCK

SOIL DESCRIPTIONS A. FRANKE

ROCK DESCRIPTIONS A. FRANKE

DISTRICT SOILS ENGR. T. CHRISTOPHER

SHEET 1 OF 3 HOLE NO. A-3



STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. A-3
LINE & STA. 1880, 865
OFFSET 532, 470

DISTRICT NO. 3
COUNTY TOMPKINS
PROJ. NO. 10300-701

PROJECT CAYUGA LAKE BASIN (6 MILE CREEK DAM SITE)
QUAD. LOCATION 15 1/3 N 32 DATE, START 1-6-72 SURF. ELEV. 792.20' HOLE
SOIL SERIES DUNKIRK DATE, FINISH 2-9-72 DEPTH TO WATER 20' RESERVED
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75 I.D. 2.25 WEIGHT OF HAMMER 300 lbs.
SAMPLER O.D. 5.00 I.D. 1.50 INSIDE LENGTH OF SAMPLER 18" HAMMER FALL
CASING 18" SAMPLER 18"

DEPTH IN FEET FROM SURFACE	BLows ON CASING	SAMPLE NO.	BLows ON SAMPLER	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
			0 6 12 18 24					
50								
55								
60								
65								
70								
75								
80								
85								
90								
95								
100								
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STATE OF NEW YORK
DEPARTMENT OF PUBLIC WORKS
BUREAU OF SOIL MECHANICS
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. A-3
LINE & STA. N 880, 865
OFFSET 532,470

DISTRICT NO. 3
COUNTY TOMPKINS
PROJ. NO. 105007G

PROJECT CAYUGA LAKE BASIN (6 MILE CREEK DAMSITE)
QUAD. LOCATION 15A 1/5 132 DATE, START 1-6-72 SURF. ELEV. 793.2
SOIL SERIES DUNKIES DATE, FINISH 2-9-72 DEPTH TO WATER ^{NO DEPTH} OBSERVED
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2-75 I.D. 2-25 WEIGHT OF HAMMER 300 LBS. HAMMER FALL
SAMPLER O.D. 2-00 I.D. 1-50 INSIDE LENGTH OF SAMPLER 18" CASING 18" SAMPLER 16"

DEPTH B BELOW SURFACE	CASING BLOWS IN SAMPLE NO.	BLOWS ON SAMPLER	CROSS SECTION	MOISTURE	DESCRIPTION OF SOIL AND ROCK	REMARKS
0	0	0 16 12 18 6 12 16 23	0	0		DRILLED WITH "AX" DIAMOND BIT TO 1500'
105						
110						
115						
120	L 600					
125	S 400					
130	U					
135						
140						
145	J-16 DRILLED				RECOVERED ASSOCIATED BOULDERS REC. 21' 5 PCS. & CHPS. 80.0'-150.0'	
150	Y	0			BOTTOM OF Hole @ 1500'	D

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FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE
AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS
TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT
IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS
A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR
JUDGMENT OF THE BIDDER.

DRILL RIG OPERATOR J. BLOCK
SOIL DESCRIPTIONS A. FRANKE
ROCK DESCRIPTIONS A. FRANKE
DISTRICT SOILS ENGR. J. CHRISTOPHER
SHEET 2 OF 3. HOLE NO. A-3

DISTRICT NO. 3
COUNTY TOMPKINS
PROJ. NO E10.300.

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. A-4
LINE 8 STA. 6+00
OFFSET 810' RT
(ALSO DESCRIBE UNDER "REMARKS")

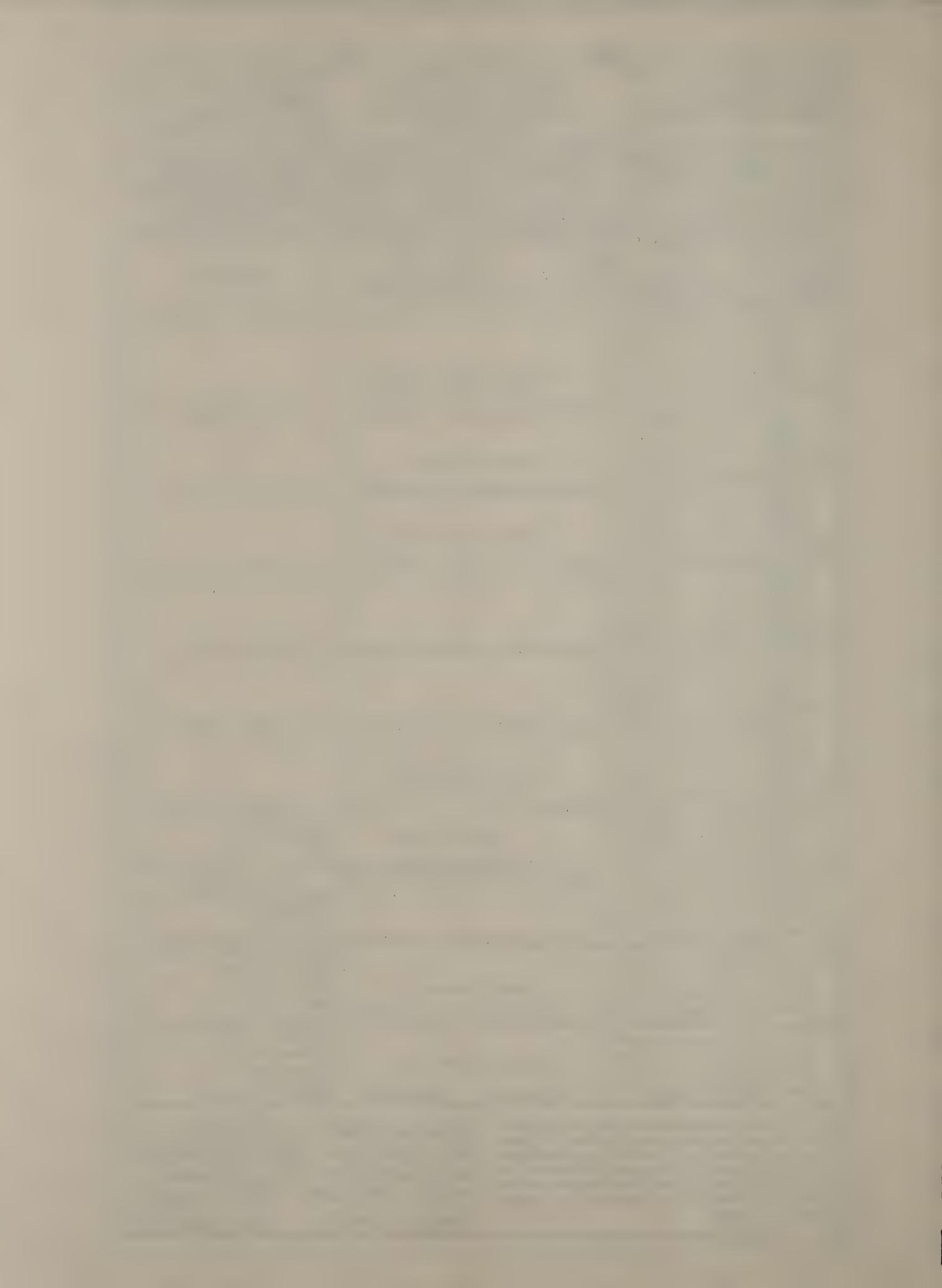
PROJECT CAYUGA LAKE BASIN: Sixmile Creek Damsite
QUAD. LOCATION 75-1-4832 DATE, START 14 June 72 SURF. ELEV. 786.0'
SOIL SERIES Dunkirk DATE, FINISH 28 June 72 DEPTH TO WATER 10' OBSERVED

CASING Q.D. 2.75 I.D. 2.25 WEIGHT OF HAMMER 300 lbs.
SAMPLER Q.D. 2.00 I.D. 1.50 INSIDE LENGTH OF SAMPLER 18" HAMMER FALL
CASING 18" SAMPLER 18"

DEPTH B BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
							0	
0								
10								
16								
16								
20								
21								
17	J-1	6	7					
19			8					
26								
28								
36								
56	J-2	7	12					
56			12					
55								
45								
47								
12	J-3	6	8					
91			11					
102								
92								
80								
20	J-4	2	2					
94			4					
78								
70								
61								
25	J-5	1	1					
98			4					
107								
93								
103								
56	J-6	5	8					
50			47					
60								
75	C-7	Drilled						
87								
35	J-8	21	52					
175			77					
250								
40	C-9	Drilled						
1								
1								
45	C-10	Drilled						
1								
1								
50	C-11	Drilled						
1								

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGEMENT OF THE BIDDER.

DRILL RIG OPERATOR J. BLOCK
SOIL DESCRIPTIONS J. F. DesChambeau
ROCK DESCRIPTIONS B.L. DAWSON
DISTRICT SOILS ENGR. J.E. Christopher
B.L.O.
SHEET 1 OF 2. HOLE NO. A-4.





SCALE

1000 0 1000 2000 3000 FEET

CONTOUR INTERVAL 10 FEET

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

BUREAU OF SOIL MECHANICS

CAYUGA LAKE BASIN

SIXMILE CREEK

P.I.N. E103.00.701.02

SITE LOCATION PLAN

APPROVED JULY 13 1972

L. H. Gilmore

DIRECTOR

REGION NO. 3

COUNTY TOMPKINS

DRAWING NO. 3 SM 1819A



STATE OF NEW YORK DEPARTMENT OF TRANSPORTATION	
BUREAU OF SOIL MECHANICS	
CAYUGA LAKE BASIN SIXMILE CREEK P.I.N. E103.00.701.02	
SITE LOCATION PLAN	
APPROVED JULY 13 1971 L. H. Gilmore DIRECTOR	REGION NO. 3 COUNTY TOMPKINS DRAWING NO 3 SM 1819A

EXISTING GROUND SURFACE 900

SP-3

ELEVATION-FT.

800

700

600

S
(BORINGS P
VERTICAL AN

DHB-1

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

SOILS MECHANICS BUREAU

CAYUGA LAKE BASIN
SIXMILE CREEK
BETHEL GROVE DAMSITE
P. I. N. E103.00.701.02
SUBSURFACE PROFILES

APPROVED JULY 13 1973

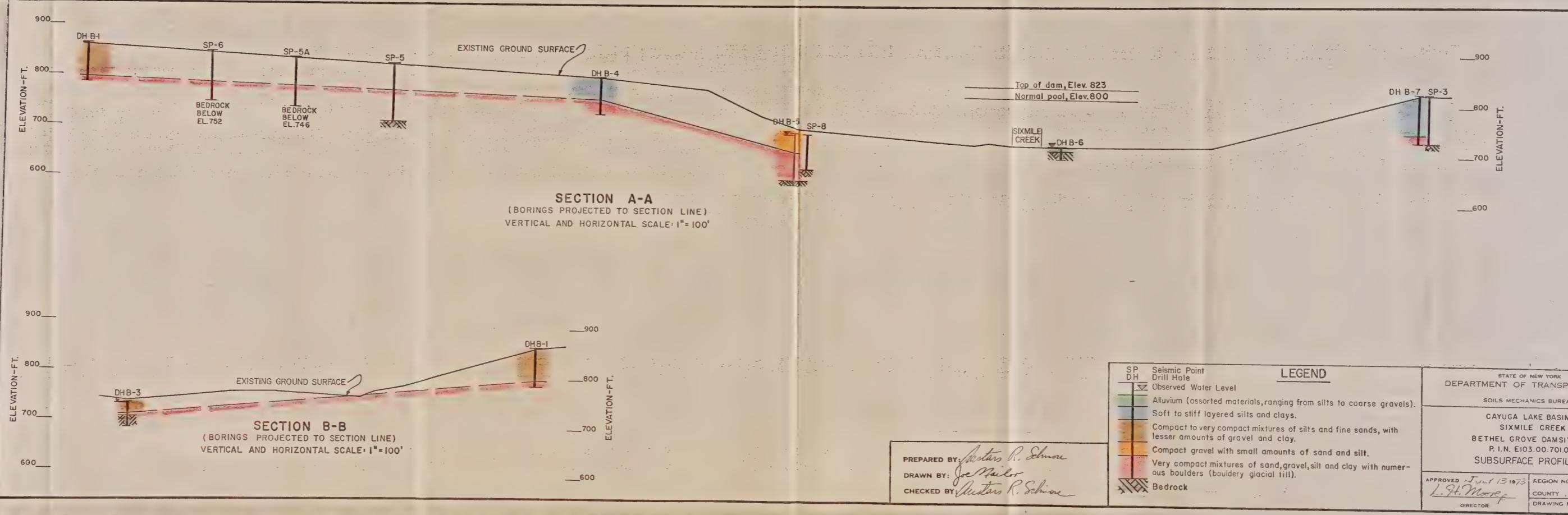
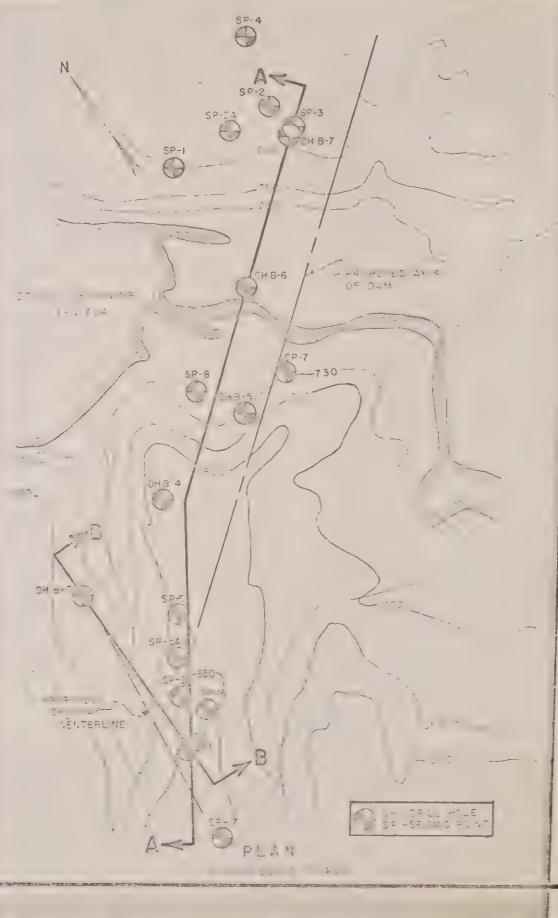
L.H. Moore

DIRECTOR

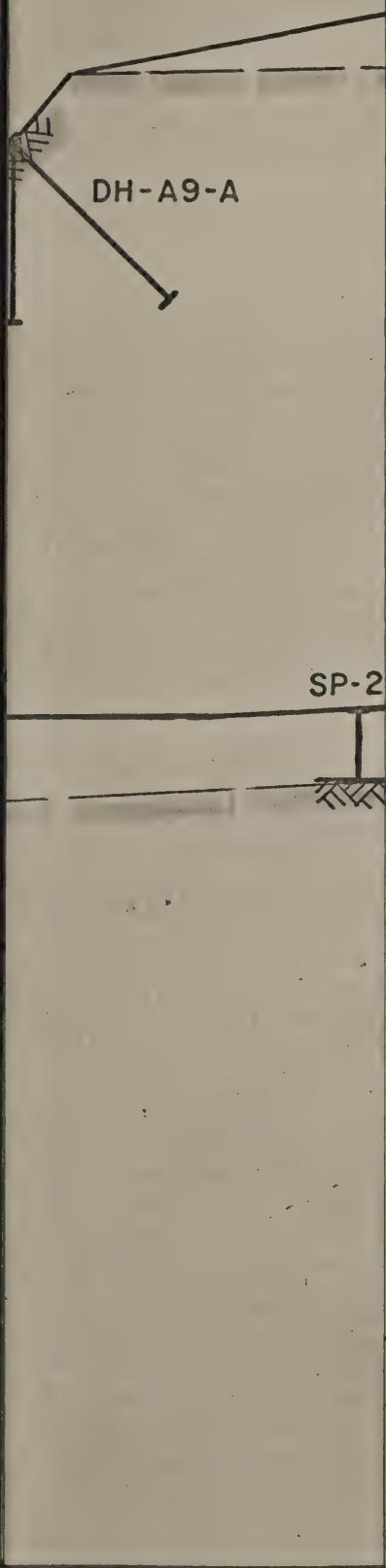
REGION NO. 3

COUNTY TOMPKINS

DRAWING NO. 3 SM 1819B







STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

SOILS MECHANICS BUREAU

CAYUGA LAKE BASIN
SIXMILE CREEK
ALTERNATE DAMSITE
P.I.N. E103.00.701.02

SUBSURFACE PROFILES

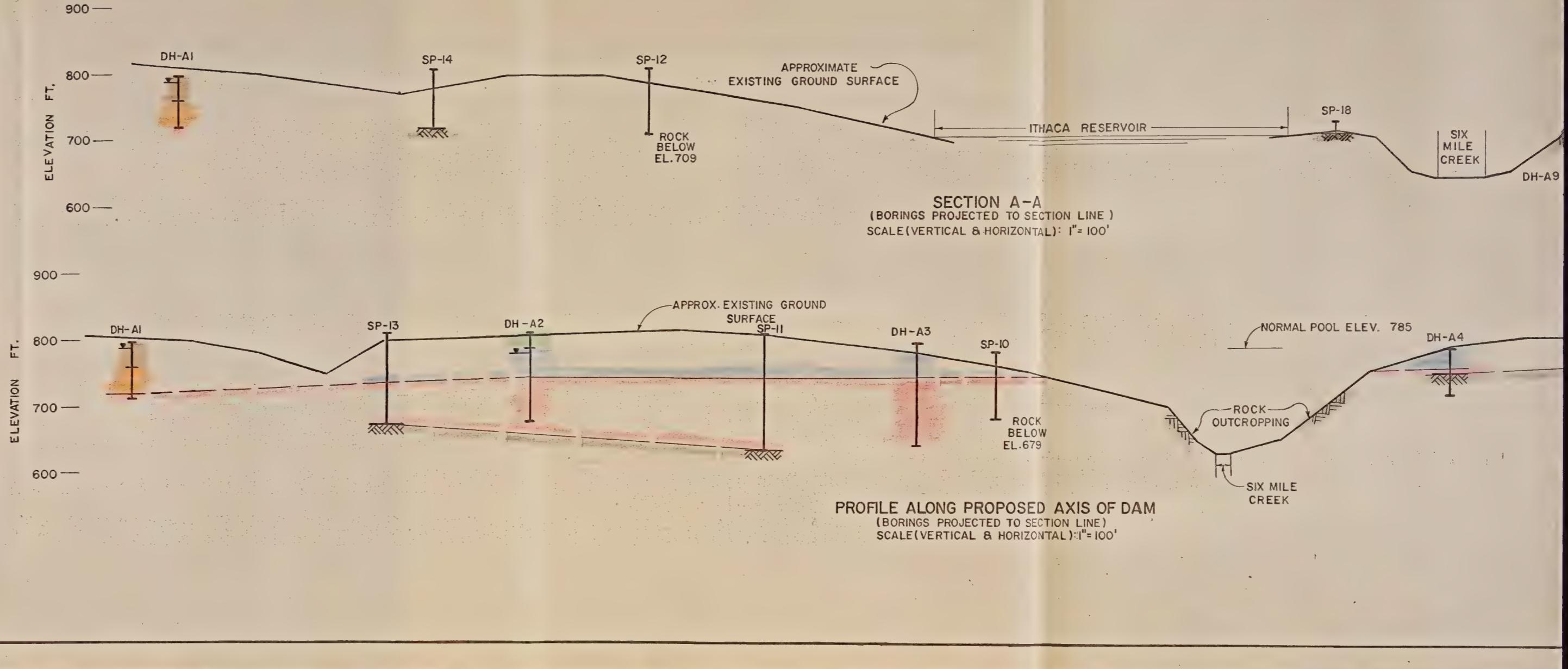
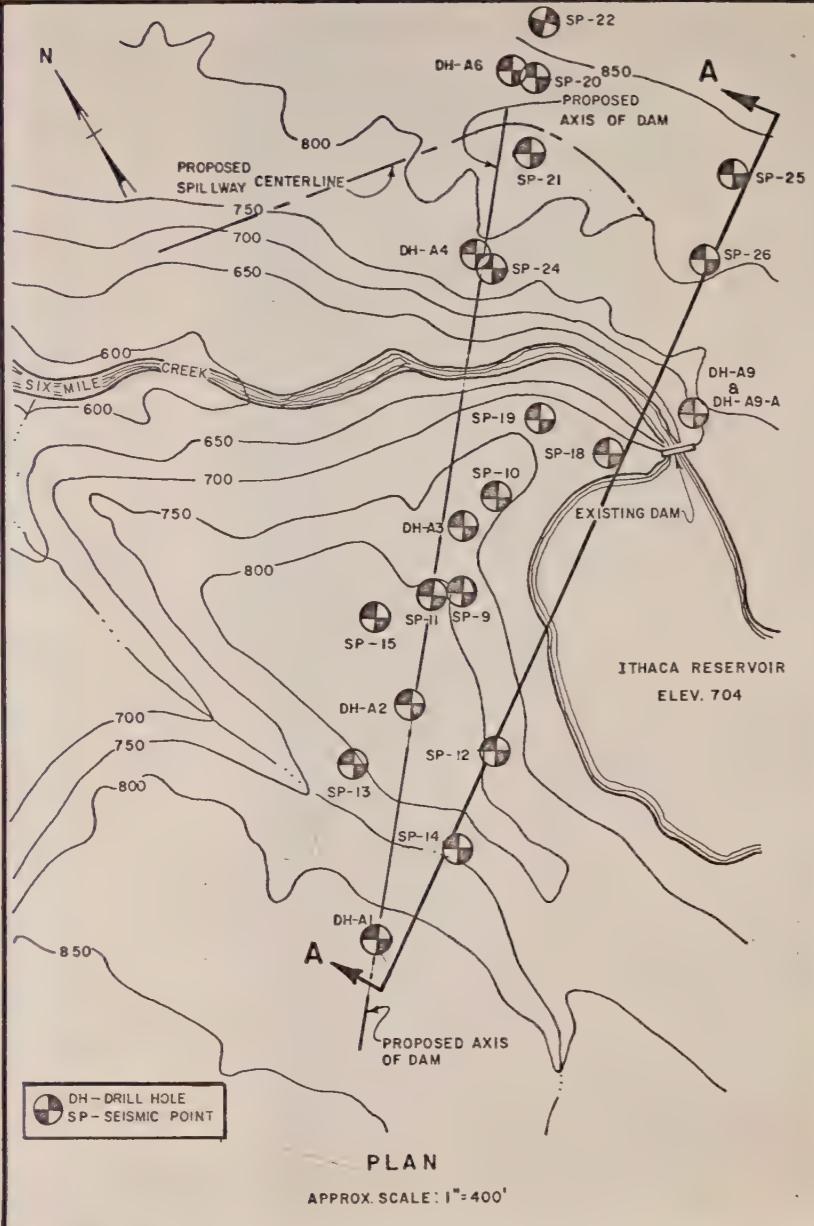
APPROVED JULY 13 1973

L.H. Moore
DIRECTOR

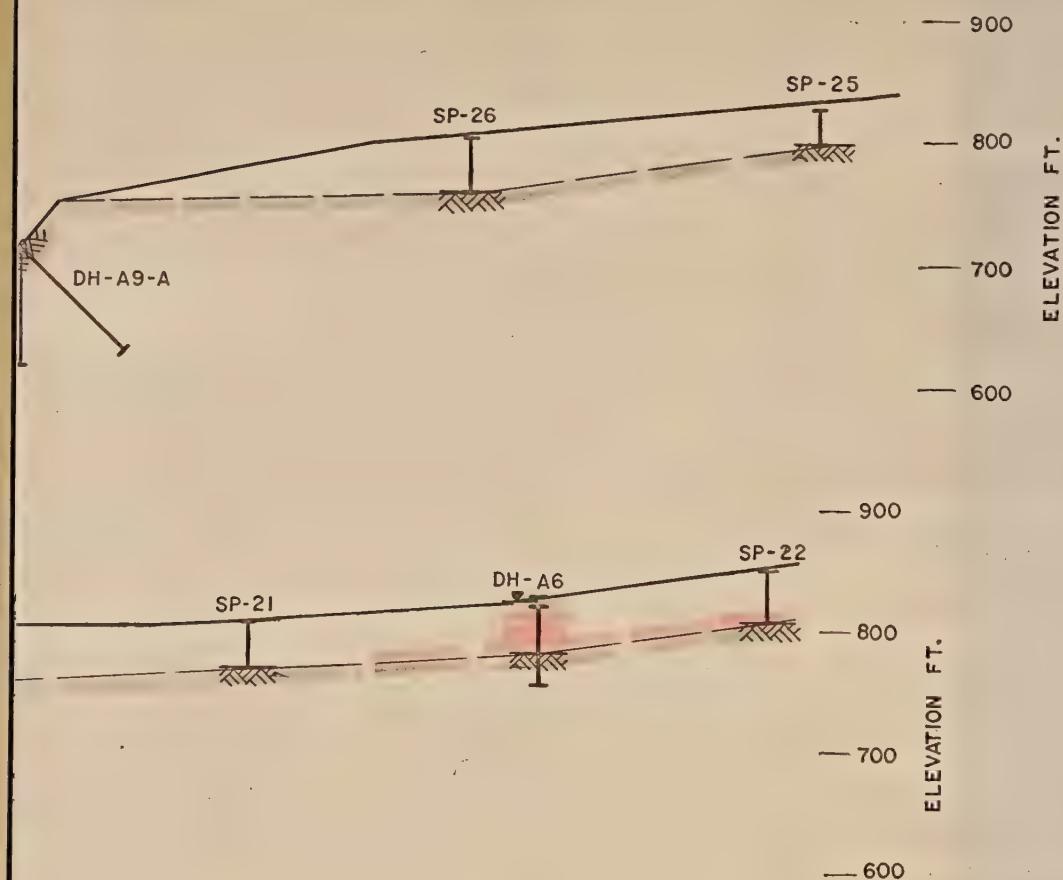
REGION NO. 3

COUNTY TOMPKINS

DRAWING NO. 3 SM 1819 C







PREPARED BY: *Mastars R. Schone*
 DRAWN BY: *Paul J. Rogers*
 CHECKED BY: *Mastars R. Schone*

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

SOILS MECHANICS BUREAU

CAYUGA LAKE BASIN
SIXMILE CREEK
ALTERNATE DAMSITE
R.I.N. E103.00.701.02

SUBSURFACE PROFILES

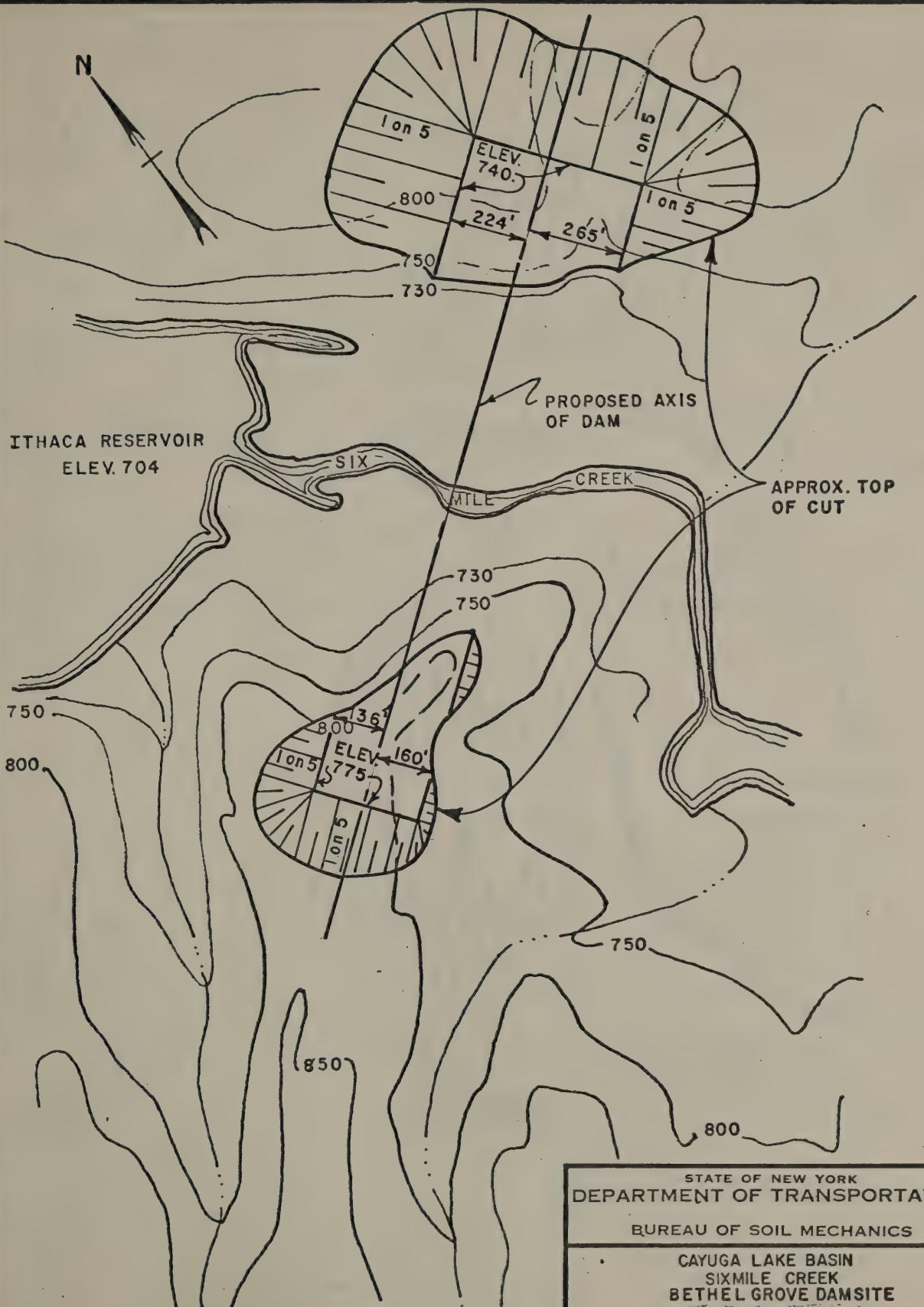
APPROVED JULY 13 1973

L. H. Moore
DIRECTOR

REGION NO. 3

COUNTY TOMPKINS

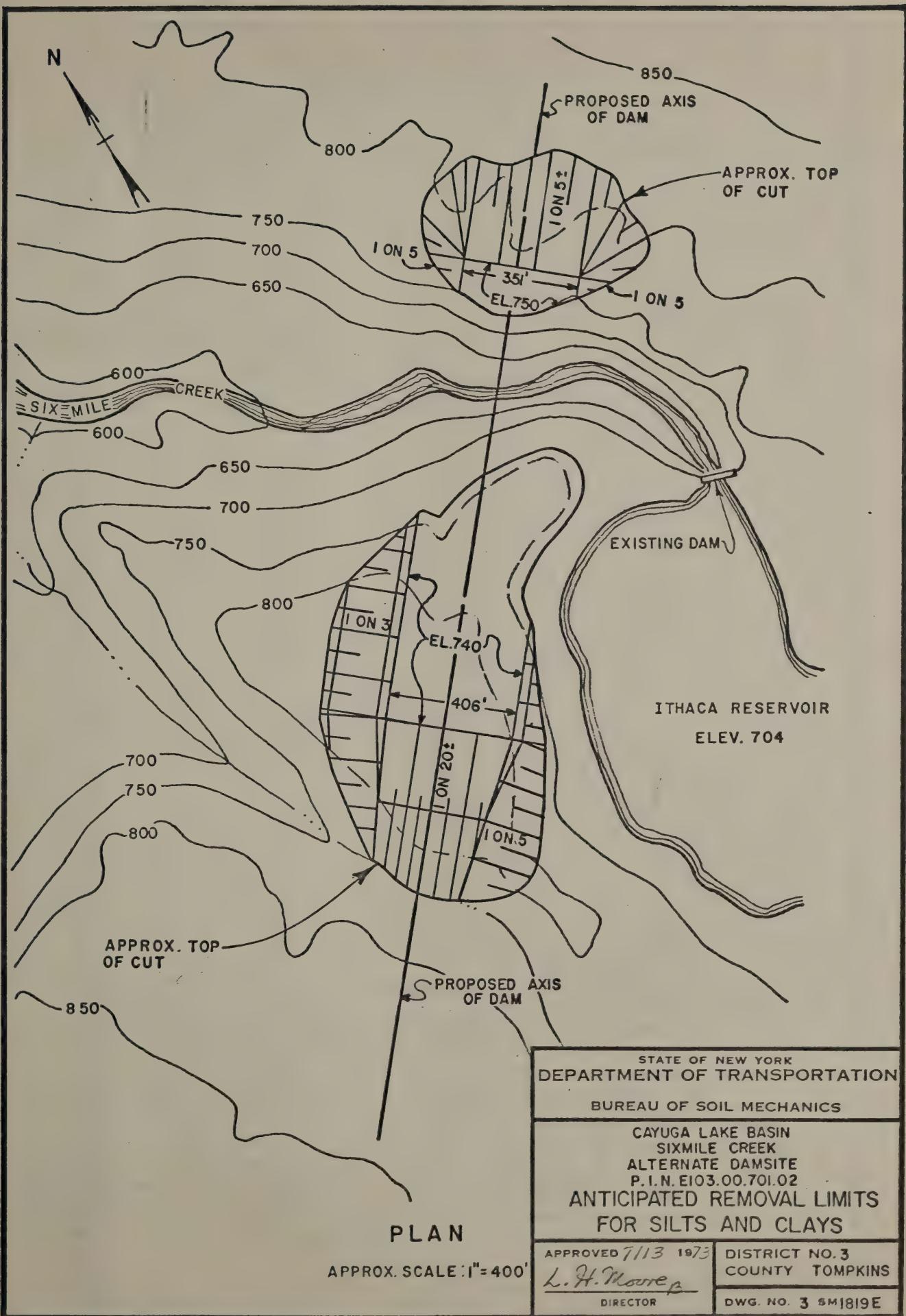
DRAWING NO. 3 5M1819 C



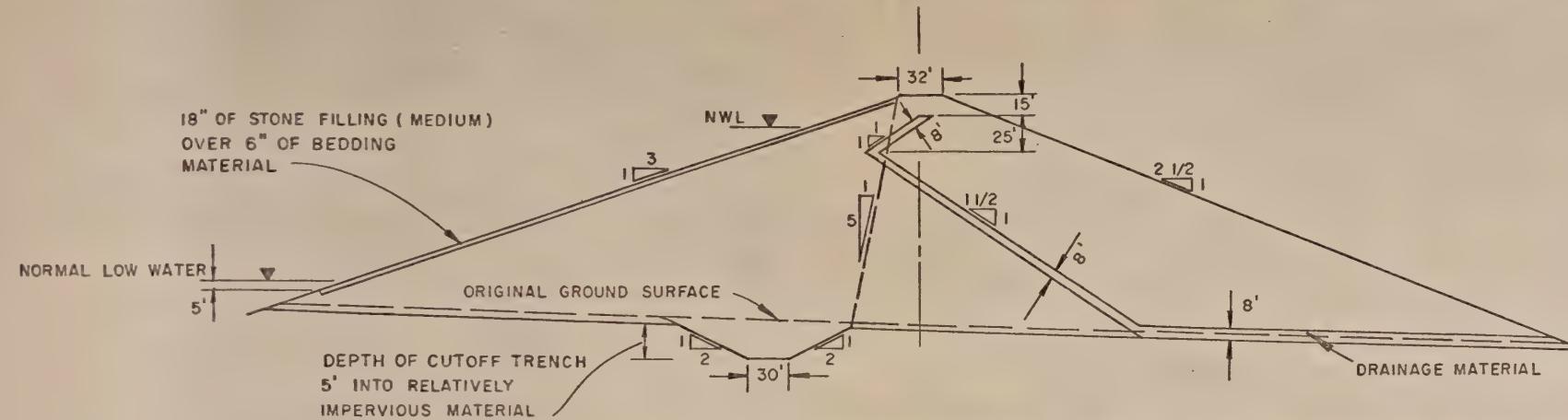
PLAN
APPROX. SCALE 1" = 400

STATE OF NEW YORK DEPARTMENT OF TRANSPORTATION BUREAU OF SOIL MECHANICS	
CAYUGA LAKE BASIN SIXMILE CREEK BETHEL GROVE DAMSITE P.T.N. E103.00.701.02	
ANTICIPATED REMOVAL LIMITS FOR SILTS AND CLAYS	
APPROVED 7/13/1973 <i>L. H. Moore</i> DIRECTOR	REGION NO. 3 COUNTY TOMPKINS
DWG. NO. 3 SM 1819D	



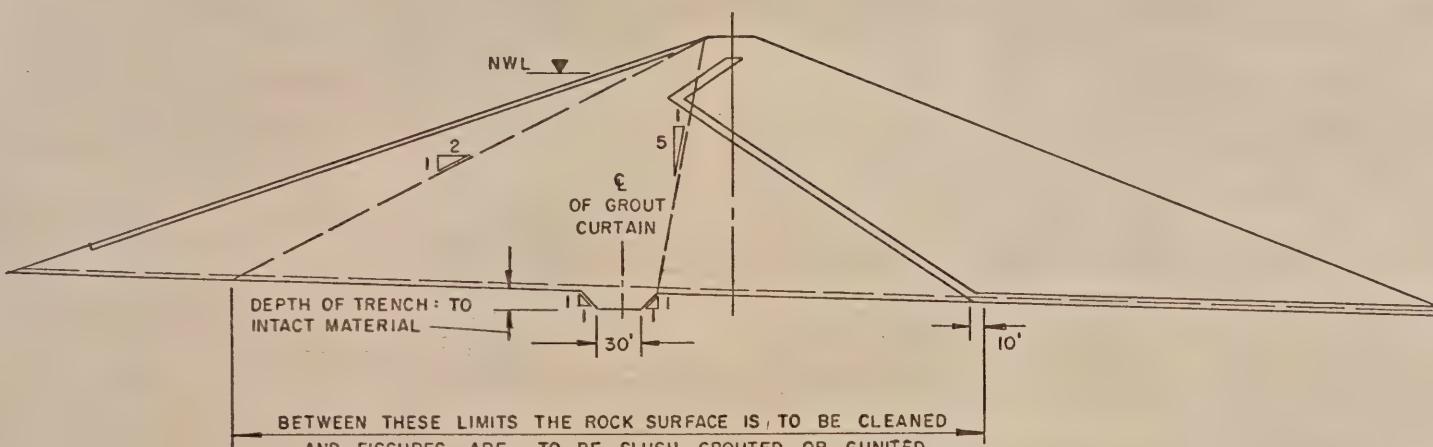






TYPICAL CROSS-SECTION OF DAM ON EARTH FOUNDATION

SCALE: 1" = 100'



TYPICAL CROSS-SECTION OF DAM ON ROCK FOUNDATION

SCALE: 1" = 100'

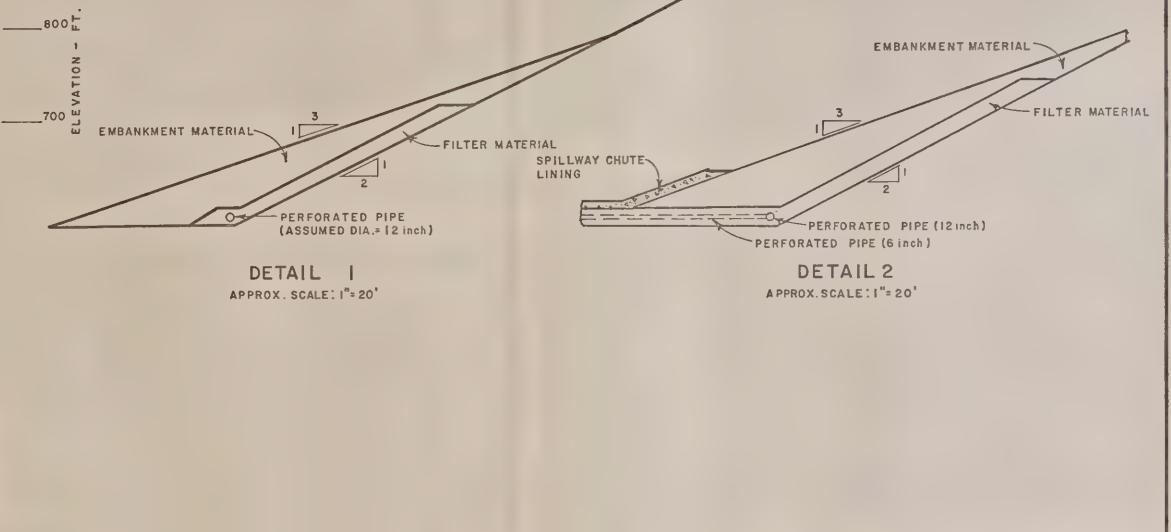
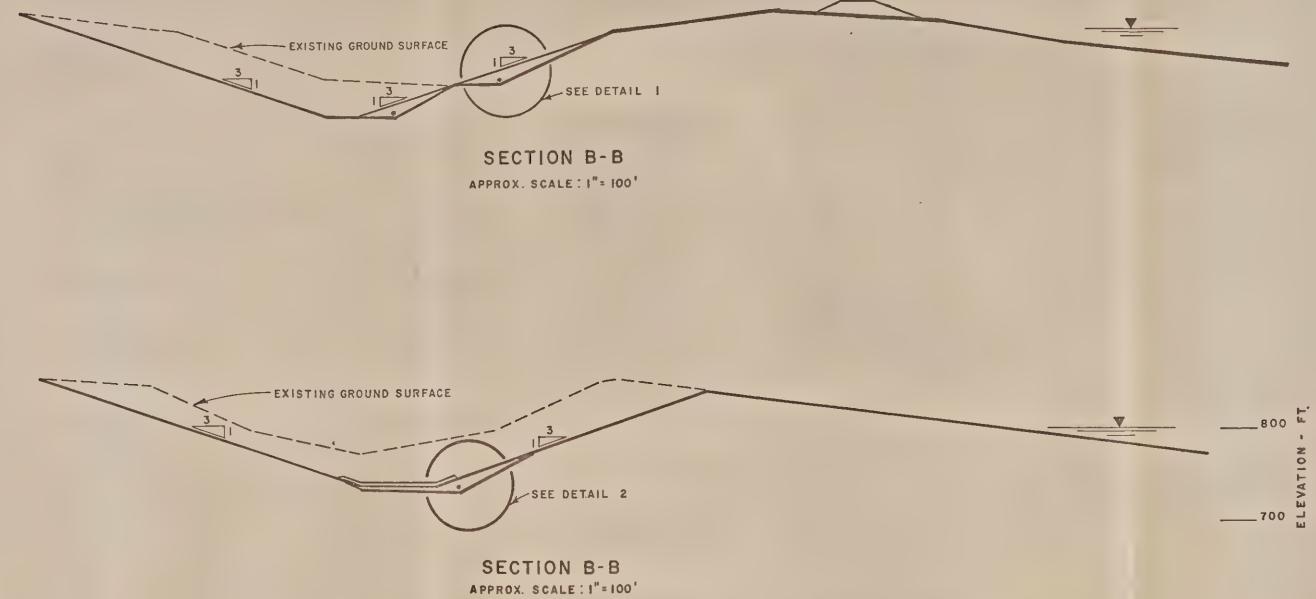
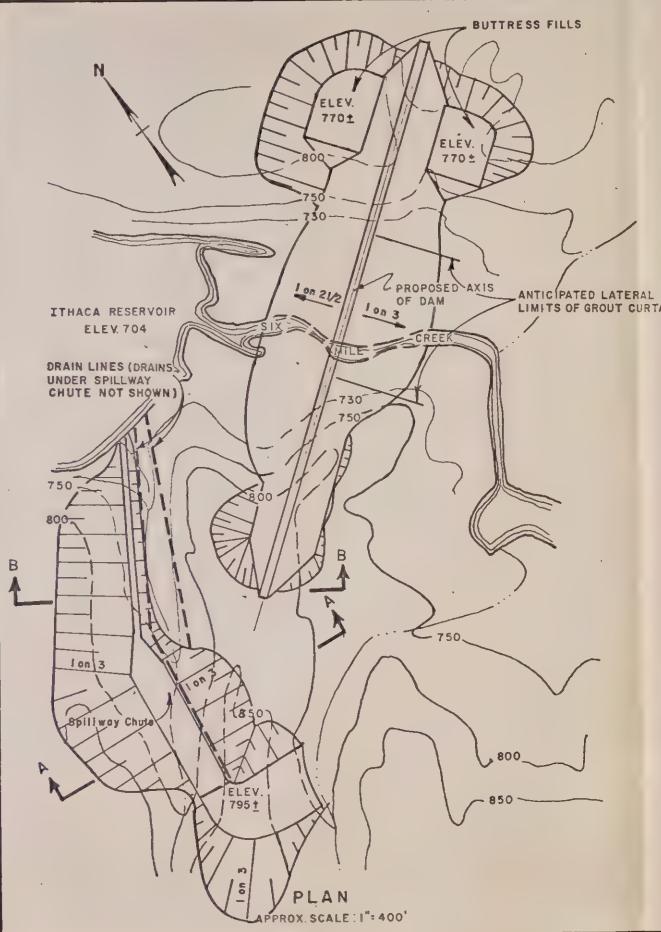
NOTE: MATERIALS, DIMENSIONS AND SLOPES SAME AS FOR DAM ON EARTH FOUNDATION, EXCEPT AS NOTED.

PREPARED BY: *Austas R. Schone*
 DRAWN BY: *F. Agostino*
 CHECKED BY: *Austas R. Schone*

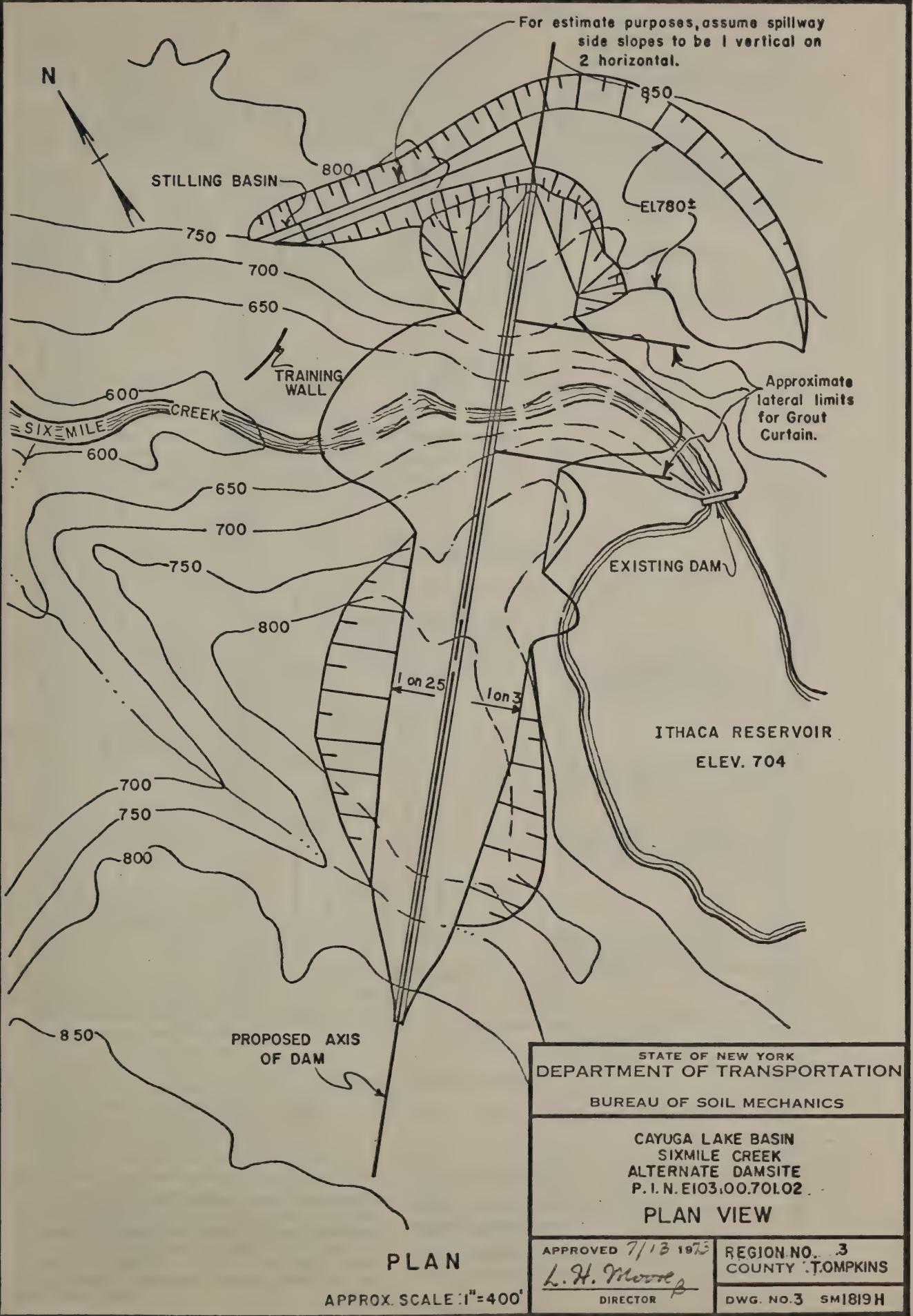
STATE OF NEW YORK
 DEPARTMENT OF TRANSPORTATION
 SOILS MECHANICS BUREAU
 CAYUGA LAKE BASIN
 SIXMILE CREEK DAMSITES
 P.I.N. E103.00-701-02
 ASSUMED TYPICAL CROSS SECTIONS
 FOR EARTH DAM

APPROVED JULY 13 1973 <i>L.H. Moore</i>	REGION NO. 3 COUNTY TOMPKINS DIRECTOR
DRAWING NO. 3 SM 1819 F	





STATE OF NEW YORK DEPARTMENT OF TRANSPORTATION BUREAU OF SOIL MECHANICS	
CAYUGA LAKE BASIN SIXMILE CREEK BETHEL GROVE DAMSITE P.I.N. E103.00.701.02	
PLAN VIEW AND SPILLWAY CROSS-SECTIONS	
PREPARED BY:	<i>Wm. L. Johnson</i>
AWN BY:	<i>W. M. May</i>
CHECKED BY:	<i>Wm. R. Johnson</i>
APPROVED JULY 1919	
REGION NO. 3	
COUNTY TOMPKINS	
DRAWING NO. 3 SM1819G	
DIRECTOR	



DISTRICT NO. 3
COUNTY TOMPKINS
PROJ. NO.
E10300.701-02

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. A-1
LINE & STA.
SEE COORDINATES BELOW
OFFSET

PROJECT CAYUGA LAKE BASIN ~ SIXMILE CREEK DAM SITE

QUAD. LOCATION 75-4-I-17 DATE, START 17 MAY 72 SURF. ELEV. 797.7
SOIL SERIES DUNKIRK DATE, FINISH 19 MAY 72 DEPTH TO WATER 10.0 ft.
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2 3/4" I.D. 2 1/4" WEIGHT OF HAMMER 300 lbs HAMMER FALL
SAMPLER O.D. 2" I.D. 1 1/2" INSIDE LENGTH OF SAMPLER 18" CASING 18" SAMPLER 18"

DEPTH BELLOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	N 879, 745 E 531, 680	REMARKS
0			0 6 12 18 24 6 12 18 24						
5	5								
10	21								
15	63								
20	41								
25	32						SILT, some GRAVEL, trace Sand and Clay		
30	14	J-1	6 6		M	BR			5.0'-6.5'
35	12								
40	13								
45	19								
50	22								
55	52	J-2	6 6		W	BR GR	SHALEY GRAVEL and SAND, some Silt, trace Clay		GW
60	61								10.0'-11.5'
65	60								
70	94								
75	113								
80	42	J-3	17 20		W	GR	SILT and SHALEY GRAVEL, trace Sand and Clay		15.0'-16.5'
85	53		17						
90	68								
95	140								
100	262								
105	110	J-4	14 17 4		W	GR	GRAVEL and SAND, Some Silt, trace Clay		20.0'-21.5'
110	20		80						
115	89								
120	154								
125	287								
130	104	J-5	25 30		W	GR	SAND and SILT, some Gravel		25.0'-26.5'
135	111		52						
140	66								
145	180								
150	215								
155	36	J-6	32 100 for 5"		W	GR	SAND, some Gravel, trace Silt		30.0'-30.5"
160	38								
165	44								
170	80								
175	96								
180	23	J-7	20 27		W	GR	GRAVEL and SAND, trace Silt		35.0'-36.5'
185	27		30						
190	46								
195	76								
200	59								
205	25	J-8	6 9		W	GR	MEDIUM SAND, trace Silt		40.0'-41.5'
210	28		11						
215	37								
220	104								
225	86								
230	27	J-9	4 7		W	GR	MEDIUM SAND, trace Silt		45.0'-46.5'
235	36		9						
240	68								
245	56								
250	51								

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGEMENT OF THE BIDDER.

DRILL RIG OPERATOR J. BLOCK
SOIL DESCRIPTIONS J. SMALL
ROCK DESCRIPTIONS —
DISTRICT SOILS ENGR. J.E. CHRISTOPHER
JS
SHEET 1 OF 2. HOLE NO. A-1

DISTRICT NO. 3
COUNTY TOMPKINS
PROJ. NO. E10300.701-02

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. A-1
LINE & STA. SEE COORDINATES BELOW
OFFSET

PROJECT CAYUGA LAKE BASIN ~ SIXMILE CREEK DAMSITE
QUAD. LOCATION 75-4-I 17 DATE, START 17 MAY 72 SURF. ELEV. 797.7
SOIL SERIES DUNKIRK DATE, FINISH 19 MAY 72 DEPTH TO WATER -10.0 ft
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2 3/4" I.D. 2 1/4" WEIGHT OF HAMMER 300 lbs HAMMER FALL
 SAMPLER O.D. 2" I.D. 1 1/2" INSIDE LENGTH OF SAMPLER 18" CASING 18" SAMPLER 18"

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF THE BIDDER.

DRILL RIG OPERATOR J. BLOCK
SOIL DESCRIPTIONS J. SMALL
ROCK DESCRIPTIONS -
DISTRICT SOILS ENGR. J.E. CHRISTOPHER
SHEET 2 OF 2. HOLE NO. A-1

DISTRICT NO. 3
COUNTY Tompkins
PROJ. NO. E10.300

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. A-4

LINE & STA.

866+00

OFFSET 810' RT.

PROJECT Cayuga Lake Basin: Sullivan Creek Damsites

QUAD. LOCATION 75-1-1/4-32

DATE, START 14 June 72 SURF. ELEV. 786.0'
DATE, FINISH 28 June 72 DEPTH TO WATER ^{NONE} OBSERVED
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75 I.D. 2.25 WEIGHT OF HAMMER 300 lbs. HAMMER FALL
SAMPLER O.D. 2.00 I.D. 1.50 INSIDE LENGTH OF SAMPLER 18" CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
50	542	100 = 2"	6 12 18 24	1	w	Gry	Decomposed & weat. Shale	"E" Spoon 50.0 ~ 50.1 Drilled with "AX" Diamond bit 50.1 ~ 55.0'
55	C-13	Drilled	1	1	1	1	Bry Limey Sandstone	
60			1	1	1	1		Drilled with "AX" Diamond bit 55.0 ~ 65.0' REC = 7.5"
65	C-14	Drilled	1	1	1	Gry	Sandstone	2,005. + Frags. Drilled with "AX" Diamond bit 65.0 ~ 70.0' REC = 5.5"
70	C-15	Drilled	1	1	1	1	Sandstone	
							Bottom of hole at 70.0'	
75								
80								
85								
90								
95								
100								

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF THE BIDDER.

DRILL RIG OPERATOR J. Block
SOIL DESCRIPTIONS J.F. DesChambeau
ROCK DESCRIPTIONS G.L. Dawson
DISTRICT SOILS ENGR. J.E. Christopher
BLD
SHEET 2 OF 2. HOLE NO. A-4

DISTRICT NO. 3
COUNTY THOMPKINS
S. PROJ. NO. 1980070

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. A-6

LINE & STA.

84175

OFFSET 235' RT.

PROJECT CITY OF ITHACA - SIX MILE CREEK DAMSITE
QUAD. LOCATION 75-1-K31 DATE, START 6-5-72 SURF. ELEV. 825.2'
SOIL SERIES DUNKIRK DATE, FINISH 6-13-72 DEPTH TO WATER - 4.0'
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 5.75 I.D. 5.25 WEIGHT OF HAMMER 300 lbs. HAMMER FALL
 SAMPLER O.D. 5.00 I.D. 4.50 INSIDE LENGTH OF SAMPLER 18" CASING 18" SAMPLER 18"

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF THE BIDDER.

DRILL RIG OPERATOR T. BLOCK

SOIL DESCRIPTIONS A: ERANKE

ROCK DESCRIPTIONS. A. FRANKE

DISTRICT SOILS ENGR. J. CHRISTOPHER

SHEET 1 OF 2 HOLE NO. A-6

DISTRICT NO. 3
COUNTY Tompkins
PROJ. NO. 10300-701

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. A-6
LINE & STA. 4125
OFFSET 235 ft.

PROJECT CITY OF ITHACA - SIX MILE CREEK DAM SITE
QUAD. LOCATION 75-1-K31 DATE, START 6-5-72 SURF. ELEV. 825.2'
SOIL SERIES DUNIKER DATE, FINISH 6-13-72 DEPTH TO WATER 4.0'
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75	I.D. 2.25	WEIGHT OF HAMMER 300 lbs.
SAMPLER O.D. 2.00	I.D. 1.50	INSIDE LENGTH OF SAMPLER 18"
		HAMMER FALL CASING 16" SAMPLER 18"

DEPTH BELOW SURFACE	SAMPLE NO.	BLOWS ON SAMPLER	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
50		0 18 12 18 24					DRILLED WITH "AX" DIAMOND BIT: REC: 32" 15 pds. & chps.
55	C-17 DRILLED					GRY SHALE	500'-550' DRILLED WITH "AX" DIAMOND BIT: REC: 10" 6 pds. & chps.
60	C-18 DRILLED					GRY SHALE	550'-600' DRILLED WITH "AX" DIAMOND BIT: REC: 5.5" 6 pds.
65	C-19 DRILLED					GRY SHALE	600'-650' DRILLED WITH "AX" DIAMOND BIT: REC: 4" pds. "E" SPOON
70	C-20 DRILLED					GRY SHALE BOTTOM OF Hole 700'	650'-700' REFUSAL

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGEMENT OF THE BIDDER.

DRILL RIG OPERATOR J. BLOCK
SOIL DESCRIPTIONS A. FRANKE
ROCK DESCRIPTIONS A. FRANKE
DISTRICT SOILS ENGR. J. CHRISTOPHER
SHEET 2 OF 2 HOLE NO. A-6

DISTRICT NO. 3
COUNTY Tompkins
PROJ. NO. E10300

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. A-9
LINE & STA. 18 Bk. Tan. Ext. 163 Taz
OFFSET 84' 4"

PROJECT Ceyuga Lake Basin Six Mile Creek Damsite
QUAD. LOCATION 75-1-K32 DATE, START July 10, 1972 SURF. ELEV. 709.6'
SOIL SERIES Dunkirk DATE, FINISH July 19, 1972 DEPTH TO WATER ^{none} OBS CURR
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 425" I.D. 375" WEIGHT OF HAMMER 300 lbs HAMMER FALL
SAMPLER O.D. 350" I.D. 300" INSIDE LENGTH OF SAMPLER 18" Casing 18' Sampler 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
0								Drilled With Roller Bit Lost Wash Water @ 40' Spoon Refused @ 50'
5								0~50' Drilled With NX Diamond Bit
10	C-1 Drilled					Gry	Limey Shale	5.0~10.0' Recovery 60" 15 Pieces + Frags Orilled With NX Diamond Bit & 10' Double Tube Barrel
15	C-2 Drilled					Gry	Limey Shale	10.0~15.0' Recovery 62" 24 Pieces + Frags Orilled With NX Double Tube Barrel
20								Recovery 114.0"
25	C-3 Drilled					Gry	Shale	15.0~25.0' Recovery 114.0" 31 Pieces + Frags Orilled With NX Double Tube Barrel
30								Recovery 120"
35	C-4 Drilled					Gry	Limey Shale	25.0~35.0' Recovery 120" 19 Pieces + Frags Orilled With NX Double Tube Barrel
40								Recovery 116"
45								11 Pieces + Frags
50	C-5 Drilled					Gry	Shale	35.0~45.0"

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF THE BIDDER.

DRILL RIG OPERATOR J. Black
SOIL DESCRIPTIONS J. DesChambes
ROCK DESCRIPTIONS J. DesChambes
DISTRICT SOILS ENGR. J. Christopher
SHEET 1 OF 2. HOLE NO. A-9

DISTRICT NO. 3
COUNTY Tompkins
B.S.M. PROJ. NO. E10,300

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. A-9
LINE & STA. 8 Blk 100 Ext 163+82
OFFSET 84'4"

PROJECT Cayuga Lake Basin: Sixmile Creek Damsite
QUAD. LOCATION 75-1-K32 DATE, START 7/10/72 SURF. ELEV. 709.6'
SOIL SERIES Dunkirk DATE, FINISH 7/19/72 DEPTH TO WATER ^{HOLE} 0' OBSERVED
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 4.25" I.D. 3.25" WEIGHT OF HAMMER 300 lbs HAMMER FALL
SAMPLER O.D. 3.50" I.D. 3.00" INSIDE LENGTH OF SAMPLER 18" CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLows ON CASING	SAMPLE NO.	BLOWS ON SAMPLER	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
50			0 6 12 18 24					Drilled With NX Diamond Bit
55	C-6 Drilled					Gry	Shale	Recovery 68" 450' ~ 550' 9 Pieces + Frags
60	C-7 Drilled					Gry	Shale	Drilled With NX Diamond Bit Some Core From Previous Run Was Picked Up 75" This Run. Recovery 75" 3 Pieces
65								55.0 ~ 60.0
70								Drilled With NX Diamond Bit Some Core From Previous Run was picked up in this Run. Recovery 1220" 9 Pieces
75								60.0 ~ 68.0
80								Drilled With NX Diamond Bit
85								Recovery 105" 9 Pieces
90								68.0 ~ 780'
95								Drilled With NX Diamond Bit
100								Recovery 120" 7 Pieces + Frags
								78.0 ~ 880'
								Drilled With NX Diamond Bit
								Recovery 115" 9 Pieces + Frags
								88.0 ~ 980'
								Bottom of Hole @ 980'

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF THE BIDDER.

DRILL RIG OPERATOR J. Block

SOIL DESCRIPTIONS

ROCK DESCRIPTIONS J. DesChambes

DISTRICT SOILS ENGR. J. Christopher

SHEET 2 OF 2. HOLE NO. A-9

DISTRICT NO. 3
COUNTY Tompkins
PROJ. NO. E10300

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. A-9A
LINE & STA. 163+82.8
Blk. Tan. Ext. A.H.
OFFSET 84' LT

PROJECT Cayuga Lake Basin, Six-Mile Creek Damsite
QUAD. LOCATION 75-1-K32 DATE, START 21 JUL 72 SURF. ELEV. 709.6
SOIL SERIES Dunkirk DATE, FINISH 16 AUG 72 DEPTH TO WATER ^{None} Observed
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 3 1/8" I.D. 3" WEIGHT OF HAMMER None
SAMPLER O.D. None I.D. INSIDE LENGTH OF SAMPLER — HAMMER FALL
CASING — SAMPLER —

DEPTH BELOW SURFACE	BLows ON Casing	SAMPLE NO.	BLows ON SAMPLER	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
0	0 5 10 15 20 24							
0								Drilled with Quarry Bit and "Nx" Flush Coupled Casing 0.0' ~ 4.8' No Recovery
5								Drilled with "Nx" Diamond Bit 4.8' ~ 10.0' Recovery = 26" 6 Pieces + Chips
10	C-1				Gry	SHALE Cores		Drilled with "Nx" Diamond Bit 10.0' ~ 15.0' Recovery = 27" 4 Pieces + Chips
15	C-2				Gry	SHALE Cores		Drilled with "Nx" Diamond Bit 15.0' ~ 20.0' Recovery = 46" 10 Pieces + Chips
20	C-3				Gry	Shale with Boulder Cores		Drilled with "Nx" Diamond Bit 20.0' ~ 25.0' Recovery = 19" 7 Pieces + Chips
25	C-4				Gry	Badly Fractured SHALE Cores		Drilled with "Nx" Diamond Bit 25.0' ~ 30.0' Recovery = 33" 8 Pieces + Chips
30	C-5				Gry	Badly Fractured SHALE Cores		Drilled with "Nx" Diamond Bit 30.0' ~ 35.0' Recovery = 74" 5 Pieces + Chips
35	C-6				Gry	SHALE Cores		Drilled with "Nx" Diamond Bit 35.0' ~ 40.0' Recovery = 63" 11 Pieces + Chips
40	C-7				Gry	SHALE Cores		Drilled with "Nx" Diamond Bit 40.0' ~ 45.0' Recovery = 57" 10 Pieces + Chips
45	C-8				Gry	SHALE Cores with Limy Shale seams		Drilled with "Nx" Diamond Bit 45.0' ~ 50.0' Recovery = 36" 9 Pieces + Chips
50	C-9				Gry	Limy SHALE Cores		

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF THE BIDDER.

DRILL RIG OPERATOR J. Block
SOIL DESCRIPTIONS —
ROCK DESCRIPTIONS D.B. Jenkins
DISTRICT SOILS ENGR. J.E. Christopher
O.J.
SHEET 1 OF 3. HOLE NO. A-9A

DISTRICT NO. 3
COUNTY Tompkins
PROJ. NO. F10300

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. A-9A
LINE B STA. 163+82.00
BK. Tan. Ext. AH.
OFFSET 84' LT

PROJECT Cayuga Lake Basin, Six-Mile Creek Damsite
QUAD. LOCATION 75-1-K 32 DATE, START 21 Jul 72 SURF. ELEV. 709.6
SOIL SERIES Dunkirk DATE, FINISH 16 Aug 72 DEPTH TO WATER Observed
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 3 1/2" I.D. 3" WEIGHT OF HAMMER - HAMMER FALL -
SAMPLER O.D. None I.D. INSIDE LENGTH OF SAMPLER - CASING - SAMPLER -

DEPTH IN FEET FROM SURFACE	SAMPLE NO.	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
0	6	12	18	24		
50						Drilled with "NX" Diamond Bit 50.0'-55.0' Recovery = 40° 4 Pieces + Chips
55	C-10			Gry	SHALE Cores	Drilled with "NX" Diamond Bit 55.0'-60.0' Recovery = 60° 6 Pieces
60	C-11			Gry	SHALE Cores	Drilled with "NX" Diamond Bit 60.0'-65.0' Recovery = 58° 4 Pieces
65	C-12			Gry	SHALE Cores	Drilled with "NX" Diamond Bit 65.0'-70.0' Recovery = 46° 13 Pieces + Chips
70	C-13			Gry	SHALE Cores	Drilled with "NX" Diamond Bit 70.0'-75.0' Recovery = 59° 8 Pieces
75	C-14			Gry	SHALE Cores with Limey Shale Seams	Drilled with "NX" Diamond Bit 75.0'-80.0' Recovery = 60° 2 Pieces
80	C-15			Gry	SHALE Cores	Drilled with "NX" Diamond Bit 80.0'-85.0' Recovery = 60° 5 Pieces
85	C-16			Gry	SHALE Cores	Drilled with "NX" Diamond Bit 85.0'-90.0' Recovery = 52° 6 Pieces
90	C-17			Gry	SHALE Cores	Drilled with "NX" Diamond Bit 90.0'-95.0' Recovery = 63° 5 Pieces
95	C-18			Gry	SHALE Cores	Drilled with "NX" Diamond Bit 95.0'-100.0' Recovery = 60° 5 Pieces
100	C-19			Gry	SHALE Cores	

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PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUB-
STITUTE FOR INVESTIGATIONS INTERPRETATION OR JUDG-
MENT OF THE BIDDER.

DRILL RIG OPERATOR J. Block
SOIL DESCRIPTIONS -
ROCK DESCRIPTIONS D. B. Jenkins
DISTRICT SOILS ENGR. J. E. Christopher
D.J.
SHEET 2 OF 3. HOLE NO. A-9A

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. A-9A
LINE B STA. 163+828
BK. Taz. Est. A.
OFFSET 84' LT

DISTRICT NO. 3
COUNTY Tompkins
PROJ. NO. E10300

PROJECT Cayuga Lake Basin, Six-Mile Creek Damsite
QUAD. LOCATION 75-1-K32 DATE, START 21 Jul 72 SURF. ELEV. 709.6
SOIL SERIES Dunkirk DATE, FINISH 16 Aug 72 DEPTH TO WATER ^{None} ~~84' LT~~
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 3 1/2" I.D. 3" WEIGHT OF HAMMER None HAMMER FALL
SAMPLER O.D. None I.D. - INSIDE LENGTH OF SAMPLER - CASING - SAMPLER -

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
			0 6 12 18 24					
-100								Drilled with "NX" Diamond Bit 100.0'-105.0' Recovery = 62" 5 Pieces
-105		C-20				Gry	SHALE Cores	Drilled with "NX" Diamond Bit 105.0'-110.0' Recovery = 57" 5 Pieces
-110		C-21				Gry	SHALE Cores	Drilled with "NX" Diamond Bit 110.0'-115.0' Recovery = 50" 8 Pieces
-115		C-22				Gry	SHALE Cores	Drilled with "NX" Diamond Bit 115.0'-118.5' Recovery = 28" 1 Piece
-120		C-23						Bottom of Hole @ 117.5'
-125								Note: Intermittent loss of Wash Water, from 10' to 19'. Lost Wash Water at 19'. This Boring was drilled at a 45° Angle adjacent to DH# A-9.
-130								
-135								
-140								
-145								
-150								

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DRILL RIG OPERATOR J. Block

SOIL DESCRIPTIONS —

ROCK DESCRIPTIONS D. B. Jenkins

DISTRICT SOILS ENGR. J. E. Christopher

D.J.

SHEET 3 OF 3...

HOLE NO. A-9A

DISTRICT NO. 3
COUNTY Tompkins
PROJ. NO. 10300

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. B-1
LINE & STA. 88473
OFFSET 36' RT

PROJECT CAYUGA LAKE BASIN - 6 MILE CREEK DAM SITE
QUAD. LOCATION 75-4-5L-4. DATE, START 5-23-72 SURF. ELEV. 861.8
SOIL SERIES DUNKIRK DATE, FINISH 5-31-72 DEPTH TO WATER ^{NONE} ~~0.5000~~
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75 I.D. 2.25 WEIGHT OF HAMMER 300 lbs. HAMMER FALL
SAMPLER O.D. 2.00 I.D. 1.50 INSIDE LENGTH OF SAMPLER 18" CASING 18" SAMPLER 18"

DEPTH IN FEET FROM SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER				CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
			0	6	12	18					
0			6	12	18	24					
5			19	J-1	5	8				M. BR. SILT, TR. CLAY & GRAVEL	50'-6.5'
			25		10						
			35								
			43								
			47								
10			21	J-2	6	6				VARVED SILT, SO. SAND (W) BR. TR. CLAY & GRAVEL	10.0'-11.5'
			34		4						
			38								
			62								
			65								
15			51	J-3	10	11				(W) BR. SILT, SO. SAND & GRAVEL	150'-16.5'
			116		12						
			93								
			79								
			47								
20			35	J-4	6	8				(W) BR. SILT, SO. FINE SAND	20.0'-21.5'
			52		11						
			63								
			126								
			77								
25			49	J-5	6	9				SILT, SOME FINE SAND, (W) BR. TR. CLAY	25.0'-26.5'
			71		14						
			71								
			120								
			109								
30			59	J-6	6	10				SILT, TR. FINE SAND (W) BR. & CLAY	30.0'-31.5'
			72		12						
			112								
			145								
			146								
35			84	J-7	12	14				(W) BR. DENSE SILT, TR. CLAY	35.0'-36.5'
			157		15						
			135								
			152								
			228								
40			185	J-8	12	16				(W) BR. SILT, TR. CLAY	40.0'-41.5'
			440		17						
			531								
			692								
			870								
45			212	J-9	6	11				LAYERED SILT & FINE (W) BR. SAND	45.0'-46.5'
			296		16						
			318								
			391								
			408								

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MENT OF THE BIDDER.

DRILL RIG OPERATOR J. BLOCK
SOIL DESCRIPTIONS A. FRANKE
ROCK DESCRIPTIONS A. FRANKE
DISTRICT SOILS ENGR. J. CHRISTOPHER
SHEET 1 OF 2. HOLE NO. B-1

DISTRICT NO. 3
COUNTY Tompkins
PROJ. NO. 10300

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. B-1

LINE & STA.

B-89+73

OFFSET 36'

1973 SEPTEMBER

PROJECT CAYUGA LAKE BASIN - 6 MILE CREEK DAMSITE
QUAD. LOCATION 75 1/4 18 1/4 DATE, START 5-23-72 SURF. ELEV. 861.8
SOIL SERIES DUNKIRK DATE, FINISH 5-31-72 DEPTH TO WATER NONE
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 2.75 I.D. 2.25 **WEIGHT OF HAMMER** 300 lbs.
SAMPLER O.D. 2.00 I.D. 1.50 **INSIDE LENGTH OF SAMPLER** 12"

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF THE BIDDER.

DRILL RIG OPERATOR T. BLOCK

SOIL DESCRIPTIONS - A. ERANKE

ROCK DESCRIPTIONS

DISTRICT SOILS ENGR. J. CHRISTOPHER

SHEET 2 OF 2 HOLE NO. 3-1

DISTRICT NO. 3
COUNTY Tompkins
PROJ. NO. E 10,300

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. B-3
Co-ordinates
N 877,665 E 533,730

PROJECT Corning Lake Basin - Sixmile Creek Damsites
QUAD. LOCATION 75-7-52-19 DATE, START 10/21/71 SURF. ELEV. 735.9'
SOIL SERIES Dunkirk DATE, FINISH 10/27/71 DEPTH TO WATER -2.0 ft.
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 3.75" I.D. 2.25" WEIGHT OF HAMMER 300 lbs HAMMER FALL
SAMPLER O.D. 2.00" I.D. 1.50" INSIDE LENGTH OF SAMPLER 18" CASING 18" SAMPLER 18"

DEPTH DOWN SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
								used 4" Casing 0~25' Used 2" Casing 25~28.3' Drilled 0~3' with 5/8" Roller Bit. GW
-0								
2								
5								
17								
76								
5' 179								
2.5 T-1 26 33								
61			26					
87								
162								
10' 429								
4.8 T-2 58 100=2"								
68								
98								
328								
15' 205								
12.9 T-3 100=3"								
101								
84								
191								
490								
20' 1100 T-4 16 100=6"								
192								
160								
1301								
25' 405 C-5 Drilled								
2.8 T-6 16 32								
112			64					
166								
30' C-7 Drilled								
C-8 Drilled								
35' C-9 Drilled								
40' C-10 Drilled								
45' C-11 Drilled								
50'								

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DRILL RIG OPERATOR J. Block

SOIL DESCRIPTIONS J. Des Chambeau

ROCK DESCRIPTIONS J. Des Chambeau

DISTRICT SOILS ENGR. J. Christopher

SHEET 1 OF 1. HOLE NO. B-3

DISTRICT NO. 3
COUNTY Tompkins
PROJ. NO. 10322

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. B-4
LINE & STA. N 878.000
OFFSET' 533.960

PROJECT Cayuga Lake Basin - 6 Mile Creek Dam Site
QUAD. LOCATION 75-4-K3 DATE, START 3/13/72 SURF. ELEV. 822.6
SOIL SERIES DUNKIRK DATE, FINISH 4/18/72 DEPTH TO WATER ^{NONE} OBSERVED
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 4.25 I.D. 3.75 WEIGHT OF HAMMER 500 lbs.
SAMPLER O.D. 3.50 I.D. 3.00 INSIDE LENGTH OF SAMPLER 18" HAMMER FALL
CASING 18" SAMPLER 18"

DEPTH BELLOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER				CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
			0	6	12	18					
0											
6											
7											
13											
23											
31											
5											
7.2	J-1	4	8								
9.0			15								
14.2											
19.0											
15.0											
28.0	J-2	12	16								
30.0			23								
28.0											
30.0											
30.3											
15											
24.0	J-3	2	3								
28.0			2								
2.8.0											
3.5.0											
3.5.5											
29.5											
26.0	J-5	1	2								
20.7			2								
20.0											
21.5											
80											
63.0	J-6	2	2								
21.5			3								
22.0											
21.8											
35											
15.0	J-7	2	2								
30.0			3								
25.1											
24.3											
40											
20.0											
22.8											
15.0	J-8	3	3								
31.5			4								
4											
45											
1.0	J-9	2	6								
2.0			18								
0											
50											

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DRILL RIG OPERATOR J. BLOCK

SOIL DESCRIPTIONS A. FRANKE

ROCK DESCRIPTIONS -

DISTRICT SOILS ENGR. J. CHRISTOPHER

SHEET 1 OF 2 HOLE NO. B-4

DISTRICT NO. 3
COUNTY Tompkins
PROJ. NO. 10300

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. B-4
LINE & STA. "N" 818,000
OFFSET "E" 533,960

PROJECT CAYOGA LAKE BASIN - 6 MILE CREEK DAM SITE
QUAD. LOCATION 75-4-K3 DATE, START 3-13-72 SURF. ELEV. 822.6
SOIL SERIES DUNKIEK DATE, FINISH 4-13-72 DEPTH TO WATER 0' OBSERVED
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 4.25	I.D. 3.75	WEIGHT OF HAMMER 500 lbs.	HAMMER FALL
SAMPLER O.D. 3.50	I.D. 3.00	INSIDE LENGTH OF SAMPLER 18"	CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	BLows ON Casing	SAMPLE NO.	BLows ON SAMPLER	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	REMARKS
60		J-10	56 100/4	*			GEAVEL, SAND & SILT, TE. M. GRAY CLAY (GRAVELY TILL)	"A" SPOON 500'-50.9'
65				*			NO SAMPLE	DRILLED WITH QUARRY BIT: 60.9' - 65.0' "A" SPOON REUSED @ 65.0'
60				*				DRILLED WITH "N" DIAMOND BIT:
65		J-11	DRILLED	*			BOULDERS	REC: 6" 6 PCS. 65.0' - 65.0'
70				*				DRILLED WITH "N" DIAMOND BIT:
75		J-12	DRILLED	*			BOULDERS	REC: 8" 4 PCS. 65.0' - 75.0'
		J-13	52 100/3	*			FINE TO MED. GRAVEL, SO. BAND & SILT	75.0' - 75.8'
				*			BOTTOM OF HOLE @ 75.8'	

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DRILL RIG OPERATOR J. BLOCK
SOIL DESCRIPTIONS A. FRANKE
ROCK DESCRIPTIONS -
DISTRICT SOILS ENGR. J. CHRISTOPHER
SHEET 2 OF 2. HOLE NO. B-4

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. B-5
LINE & STA. SEE REMARKS
for DH Location
OFFSET
PROJECT CAYUGA LAKE BASIN: SIXMILE CREEK DAMSITES (BETHEL GROVE)
QUAD. LOCATION 75-1-165-2 DATE, START 22 SEP 71 SURF. ELEV. 719.9
SOIL SERIES DUNKIRK DATE, FINISH 12 OCT 71 DEPTH TO WATER -4.0 ft.
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 4 $\frac{1}{4}$ " I.D. 3 $\frac{3}{4}$ " WEIGHT OF HAMMER 300 lbs HAMMER FALL
SAMPLER O.D. 2" I.D. 1 $\frac{1}{2}$ " INSIDE LENGTH OF SAMPLER 18" CASING 18" SAMPLER 18"

DEPTH B BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK	GRID LOCATION from USGS SHEETS: REMARKS
0			0 6 12 18 24					N 818, 290 E 534, 245
16								
200	C-1	DRILLED	0				BOULDER CORES 9 $\frac{1}{2}$ " REC. 1 pc.	NX DIAMOND BIT 1.0' to 3.0'
26			0					
53	C-2	DRILLED	0				BOULDER CORES 8 $\frac{1}{2}$ " REC. 5 pcs.	NX DIAMOND BIT 3.0' to 5.0'
79			0					
9	J-3	9 17	0				MEDIUM SAND, some Silt and Gravel	5.0' - 6.5'
13			0					
30			0					Hawthorne Bit ahead of casing 6.5' - 10.0'
196			0					
312			0					
91	J-4	14 16	0					
437			20					10.0' - 11.5'
417			0					Hawthorne refused 11.5'
522	C-5	DRILLED	0				BOULDER CORES 6" REC. 6 pcs. + chips	NX DIAMOND BIT 11.5' to 15.0'
871			0					BOULDER BUSTER to 15.0'
62	J-6	21 32	0				SHALEY GRAVEL, some Sand and Silt	15.0' - 16.5'
73			46					
108			0					Hawthorne Bit ahead of casing 16.5' - 20.0'
133			0					
139			0					
72	J-7	4 13	0				SHALEY GRAVEL, trace Silt	20.0' - 21.5'
80			26					
96			0					Hawthorne Bit ahead of casing 21.5' - 25.0'
210			0					
270			0					
95	J-8	8 23	0				SHALEY GRAVEL, trace Sand and Silt	25.0' - 26.5'
104			53					
116			0					Hawthorne Bit ahead of casing 26.5' - 30.0'
132			0					
158			0					
140	J-9	9 17	0				SHALEY GRAVEL, trace Sand and Silt	30.0' - 31.5'
345			23					
672			0					Hawthorne Bit ahead of casing 31.5' - 35.0'
833			0					
1000			0					
456	J-10	12 21	0				SHALEY GRAVEL and SAND, trace Silt	35.0' - 36.5'
152			32					
186			0					Roller Bit 36.5' - 40.0' ahead of casing. Boiled in 3.5' at 40.0'
170			0					
261			0					
232	J-11	WASH	0				FINE GRAVEL and SHALEY GRAVEL, trace Sand	40.0' - 41.5'
208			0					
333			0					
266			0					
290			0					
293	J-12	100 87	0				SHALEY GRAVEL and FINE GRAVEL, some Sand, trace Silt and Clay	45.0' - 46.5'
168			65					
300			0					
275			0					
450			0					
50			0					

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PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUB-
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MENT OF THE BIDDER.

DRILL RIG OPERATOR J. BLOCK
SOIL DESCRIPTIONS J. Small
ROCK DESCRIPTIONS J. Small
DISTRICT SOILS ENGR. J. CHRISTOPHER
SHEET 1 OF 3 HOLE NO. B-5

DISTRICT NO. 3
COUNTY TOMPKINS
PROJ. NO. E10300

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. 8-5
LINE & STA. SEE REMARKS
for DH Location
OFFSET _____

PROJECT CAYUGA LAKE BASIN: SIXMILE CREEK DAMSITES (BETHEL GROVE)
QUAD. LOCATION ~~75-4 E 1/4~~ DATE, START 22 SEP 71 SURF. ELEV. 719.9
SOIL SERIES JUNKIRK DATE, FINISH 12 OCT 71 DEPTH TO WATER -4.0 ft.
75-4 E 1/4 (ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 4 1/4" I.D. 3 3/4" WEIGHT OF HAMMER 300 lbs HAMMER FALL
 SAMPLER O.D. 2" I.D. 1 1/2" INSIDE LENGTH OF SAMPLER 18" CASING 18" SAMPLER 18"

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUBSTITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDGMENT OF THE BIDDER.

DRILL RIG OPERATOR J. BLOCK
SOIL DESCRIPTIONS J. SMALL
ROCK DESCRIPTIONS J. SMALL
DISTRICT SOILS ENGR. J. CHRISTOPHER JS

SHEET 2 OF 3. HOLE NO. B-5

DISTRICT NO. 3
COUNTY TOMPKINS
PROJ. NO. E10300

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. B-5
LINE & STA. SEE REMARKS
or 2- Location
OFFSET
PROJECT CAYUGA LAKE BASIN: SIXMILE CREEK DAMSITES (BETHEL GROVE)
QUAD. LOCATION 75-56169 DATE, START 22 SEP 71 SURF. ELEV. 719.9
SOIL SERIES DUNKIRK DATE, FINISH 12 OCT 71 DEPTH TO WATER -4.0 ft.
(ALSO DESCRIBE UNDER "REMARKS")

CASING O.D. 4 1/4" I.D. 3 3/8" WEIGHT OF HAMMER 300 lbs HAMMER FALL
SAMPLER O.D. 2" I.D. 1 1/2" INSIDE LENGTH OF SAMPLER 18" CASING 18" SAMPLER 18"

DEPTH BELOW SURFACE	NO. OF BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER	CROSS SECTION	MOISTURE	DESCRIPTION OF SOIL AND ROCK	GRID LOCATION from USGS SHEETS: REMARKS
100	NO BLOWS ON CASING	C-22	DRILLED	HHHH		SHALE ROCK CORES GR 60" REC. 29 pcs. Bottom of Hole at 104.0 ft.	AX DIAMOND BIT 99.0' to 104.0'
105							
110							
115							
120							
125							
130							
135							
140							
145							
150							
155							
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795							
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805							
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825							
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840							
845							
850							
855							
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865							
870							
875							
880							
885							
890							
895							
900							
905							
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935							
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960							
965							
970							
975							
980							
985							
990							
995							
1000							

THE SUBSURFACE INFORMATION SHOWN HEREON WAS OBTAINED
FOR STATE DESIGN AND ESTIMATE PURPOSES. IT IS MADE
AVAILABLE TO BIDDERS ONLY THAT THEY MAY HAVE ACCESS
TO IDENTICAL INFORMATION AVAILABLE TO THE STATE. IT IS
PRESENTED IN GOOD FAITH, BUT IS NOT INTENDED AS A SUB-
STITUTE FOR INVESTIGATIONS, INTERPRETATION OR JUDG-
MENT OF THE BIDDER.

DRILL RIG OPERATOR J. Block
SOIL DESCRIPTIONS J. Small
ROCK DESCRIPTIONS J. Small
DISTRICT SOILS ENGR. J. CHRISTOPHER JS
SHEET 3 OF 3. HOLE NO. B-5

DISTRICT NO. 3
COUNTY Tompkins
B.S.M. PROJ. NO. 10-500-70

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. B-6
LINE & STA. LB78, 725
OFFSET E 535.640

PROJECT CAYUGA LAKE BASIN - 6 MILE CREEK DAM SITE
 QUAD. LOCATION 15/4/LP DATE, START 3-1-72 SURF. ELEV. 706.3
 SOIL SERIES DUNKIRK DATE, FINISH 3-6-72 DEPTH TO WATER 1.0'
 (ALSO DESCRIBE UNDER "REMARKS")

CASING	O.D. <u>4.25</u>	I.D. <u>3.75</u>	WEIGHT OF HAMMER	<u>300 lbs.</u>	HAMMER FALL
SAMPLER	O.D. <u>2.50</u>	I.D. <u>3.00</u>	INSIDE LENGTH OF SAMPLER	<u>18"</u>	CASING <u>18"</u> SAMPLER <u>18"</u>

DEPTH BLOW SURFACE CASING	SAMPLE NO.	BLOWS ON SAMPLER	CROSS SECTION	MOISTURE	DESCRIPTION OF SOIL AND ROCK	REMARKS
0		0 6 12 18 24				
0		0				
0		0				
0		0				
0		0				
0		0				
5						
8 1						
17 2						
38 5						
10						
	C-1 DRILLED			GRY	SHALE	
15						
17						
17	C-2 DRILLED			GRY	SHALE	DRILLED WITH "NX" DIAMOND BIT: REC: 21" 7 pos. 9.0'-12.0'
20						
25						
	C-3 DRILLED			GRY	SHALE	DRILLED WITH "NX" DIAMOND BIT: REC: 96" 24 pos. 17.0'-26.0'
					BOTTOM OF Hole @ 26.0'	

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DRILL RIG OPERATOR J. BLOCK

SOIL DESCRIPTIONS

ROCK DESCRIPTIONS A. FRANKE

DISTRICT SOILS ENGR. J. CHRISTOPHER

SHEET 1 OF 1. HOLE NO. 5-6.

DISTRICT NO. 3
 COUNTY Tompkins
 PROJ. NO. E10300

STATE OF NEW YORK
 DEPARTMENT OF TRANSPORTATION
 SOIL MECHANICS BUREAU
 SUBSURFACE EXPLORATION LOG
 (STATE FORCES)

HOLE NO. B-7
 LINE & STA. _____
 Coordinates: N 879, 265 ±
 OFFSET E 535, 020 ±
 (ALSO DESCRIBE UNDER "REMARKS")

PROJECT Cayuga Lake Basin - Six Mile Creek Dam Site (Bethel Grove)
 QUAD. LOCATION 75-4-M18 DATE, START 24 Apr 72 SURF. ELEV. 824.9
 SOIL SERIES Dunkirk DATE, FINISH 1 May 72 DEPTH TO WATER ^{Note} Observed

CASING O.D. 2.75" I.D. 2.25" WEIGHT OF HAMMER 300 lb
 SAMPLER O.D. 1.5" I.D. 1.0" INSIDE LENGTH OF SAMPLER 18" HAMMER FALL
 Casing 18" Sampler 18"

DEPTH BELOW SURFACE	BLOWS ON CASING	SAMPLE NO.	BLOWS ON SAMPLER	CROSS SECTION	MOISTURE	COLOR	DESCRIPTION OF SOIL AND ROCK		REMARKS
							0	5	
-0	6								
	6								
	8								
	9								
5	11	J-1	2 3						
	9		4						
	11								
	12								
10	15	J-2	5 10						
	21		7						
	24								
	25								
15	20	J-3	6 4						
	22		5						
	25								
	22								
	23								
20	33	J-4	8 8						
	34		8						
	28								
	21								
	28								
25	35	J-5	1 1						
	35		1						
	35								
	37								
30	42	J-6	1 2						
	34		2						
	37								
	38								
35	39	J-7	WOW WOW						
	27		2						
	35								
	35								
40	37	J-8	2 2						
	34		2						
	37								
	50								
45	45	J-9	1 2						
	51		2						
	57								
	59								
	68								
	72								

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DRILL RIG OPERATOR J. Block
 SOIL DESCRIPTIONS D.B. Jenkins
 ROCK DESCRIPTIONS —
 DISTRICT SOILS ENGR. J.E. Christopher
 D.J.
 SHEET 1 OF 2. HOLE NO. B-7

DISTRICT NO. 3
COUNTY Tompkins
PROJ. NO. E10300

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU
SUBSURFACE EXPLORATION LOG
(STATE FORCES)

HOLE NO. B-7
LINE & STA.
Coordinates: N 87° 26' 52"
OFFSET E 53° 02' 05"
Site (Bethel Grove)
E. ELEV. 824.9
TH TO WATER Observed
DESCRIBE UNDER "REMARKS"

PROJECT Cayuga Lake Basin - Six Mile Creek Dam Site (Bethel Grove)
QUAD. LOCATION 75-4-M18 DATE, START 24 Apr 72 SURF. ELEV. 824.9
SOIL SERIES Dunkirk DATE, FINISH 1 May 72 DEPTH TO WATER ^{None} Observed
(ALSO DESCRIBED UNDER REMARKS)

CASING O.D. 2.75" I.D. 2.25" WEIGHT OF HAMMER 300 LB HAMMER FALL
SAMPLER O.D. 1.5" I.D. 1.0" INSIDE LENGTH OF SAMPLER 18" CASING 18" SAMPLER 18"

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DRILL RIG OPERATOR J. Block
SOIL DESCRIPTIONS J. S. Jenkins
ROCK DESCRIPTIONS -
DISTRICT SOILS ENGR. J. E. Christopher
D. J.
SHEET 2 OF 2. HOLE NO. B-7

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